
Cost-effectiveness of endodontic molar retreatment compared with fixed partial dentures and single-tooth implant alternatives

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Record Status

This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary

This study examined the cost-effectiveness of strategies for the management of a tooth after failed root canal treatment, including non-surgical or surgical re-treatment, or replacement with an implant-supported restoration or a fixed partial denture. The authors concluded that endodontic microsurgery was the most cost-effective strategy, followed by non-surgical re-treatment and restoration, then extraction with a fixed partial denture, and finally extraction with an implant-supported restoration. The study had some methodological limitations that might affect the validity of the authors' conclusions.

Type of economic evaluation

Cost-effectiveness analysis

Study objective

This study examined the cost-effectiveness of alternative strategies for the management of a tooth, in which root canal treatment had failed. These were non-surgical or surgical re-treatment, or replacement with an implant-supported restoration or a fixed partial denture.

Interventions

Seven treatments for a first molar, in which treatment had failed, were considered. Four were non-surgical re-treatment (NSRT): one with full-coverage restoration; one with crown lengthening, then full-coverage restoration; one with post and core, then full-coverage restoration; and one with crown lengthening, then post and core, then full-coverage restoration. The remaining three were endodontic microsurgery, extraction with a fixed partial denture, and extraction with a single implant-supported restoration.

Location/setting

USA/secondary care.

Methods

Analytical approach:

The analysis was based on a decision-tree model, with a short time horizon. The authors did not state the perspective adopted.

Effectiveness data:

Electronic databases were searched to identify the relevant sources of evidence. The keywords used in the search were reported in detail. Only published meta-analyses were selected. Additional studies were identified in a manual search. The key endpoint of the clinical analysis was the tooth survival rate, which was defined as functional retention without adverse clinical signs or symptoms.

Monetary benefit and utility valuations:

Not considered.

Measure of benefit:

The tooth survival rate was the summary benefit measure. The success rate was used if the survival rate was not available and the definition of success varied depending on the intervention.

Cost data:

The economic analysis included the costs of each treatment method, based on average national fees from the 2009 survey of dental fees, carried out by the American Dental Association. Some assumptions were made. Specialist and general dentist fees were considered separately. All costs were in US dollars (\$) and the price year was 2009.

Analysis of uncertainty:

One-way sensitivity analyses were carried out to assess the impact, on the cost-effectiveness ratios, of variations in the cost estimates and the success rate. The ranges of values for the probabilities of success were from the meta-analyses.

Results

The fees for NSRT were \$944.65 for general dentists and \$1,256.48 for endodontists. The fees for crown lengthening were \$553.08 for general dentists and \$924.20 for periodontists. The fees for porcelain-fused-to-metal crowns were \$945.27 for general dentists and \$1,380.20 for prosthodontists. The fees for post and core were \$269.65 for general dentists and \$397.71 for prosthodontists. The fees for extraction followed by a fixed partial denture were \$2,957.07 for general dentists and \$4,253.75 for specialists. The fees for extraction and single implant-supported crown were \$3,771.25 for general dentists and \$4,569.95 for specialists. The fees for endodontic microsurgery were \$698.06 for general dentists and \$1,089.88 for endodontists.

The survival rates were 87% for NSRT, 94% for endodontic micro-surgery, 89.1% for fixed a partial denture, and 94.5% for a single implant-supported crown.

The effectiveness was divided by the costs, for general dentists and for specialists. For general dentists, the results were 0.1347 for endodontic microsurgery, 0.0460 for NSRT with restoration, 0.0403 for NSRT with post and core then restoration, 0.0356 for NSRT with crown lengthening, then restoration, 0.0320 for NSRT with crown lengthening, then post and core, then restoration, 0.0301 for a fixed partial denture, and 0.0251 for a single implant-supported crown. The same ranking was found for specialists.

The sensitivity analysis showed that this ranking was generally stable to variations in the model parameters; a lower survival rate for NSRT made these options less cost-effective compared with the two extraction options.

Authors' conclusions

The authors concluded that endodontic microsurgery was the most cost-effective strategy, followed by non-surgical re-treatment and crown restoration, then extraction and with a fixed partial denture, and finally extraction with a single implant-supported restoration.

CRD commentary

Interventions:

The rationale for the selection of the comparators was clear as the authors considered all the available strategies for the management of a tooth after failed root canal treatment.

Effectiveness/benefits:

A valid approach appears to have been used to identify the sources for the clinical data. The authors searched commonly used electronic databases and they reported the keywords used. Meta-analyses generally have high quality methods, but the studies included in each analysis were not described. The authors justified their use of the tooth survival rate as the summary benefit measure, rather than success, the definition of which varied between studies. This benefit measure was specific to the dental condition and cannot be compared with the benefits of other health interventions.

Costs:

The perspective was not stated and remains unclear; the authors only considered the fees for each treatment and did not state who paid these fees. The costs appear to have been appropriate as they came from a valid US survey, but the unit costs and resource quantities were not reported separately. Little information was given on the total costs, reducing the transparency of the analysis. Some costs were varied in a deterministic sensitivity analysis. The price year was reported.

Analysis and results:

The results were clearly presented, but the method used to synthesise the costs and benefits was unusual. Instead of calculating cost-effectiveness ratios, the authors calculated effectiveness-cost ratios, the meaning of which is unclear. Average ratios were calculated and no incremental analysis was conducted. The uncertainty was investigated, using a deterministic approach that considered only variations in the costs and outcomes. The authors compared their results with those of other published studies, highlighting the reasons for any differences. The analysis was specific to the USA and the transferability of the results was not discussed. The main limitation of the analysis was the unusual method used to calculate cost-effectiveness.

Concluding remarks:

The study had some methodological limitations that might affect the validity of the authors' conclusions.

Funding

Not stated.

Bibliographic details

Kim SG, Solomon C. Cost-effectiveness of endodontic molar retreatment compared with fixed partial dentures and single-tooth implant alternatives. *Journal of Endodontics* 2011; 37(3): 321-325

PubMedID

21329815

DOI

10.1016/j.joen.2010.11.035

Original Paper URL

[http://www.jendodon.com/article/S0099-2399\(10\)00978-7/abstract](http://www.jendodon.com/article/S0099-2399(10)00978-7/abstract)

Indexing Status

Subject indexing assigned by NLM

MeSH

Apicoectomy /economics; Cost-Benefit Analysis; Crown Lengthening /economics; Crowns /economics; Dental Abutments /economics; Dental Implants, Single-Tooth /economics; Dental Porcelain /economics; Dental Prosthesis, Implant-Supported /economics; Denture, Partial, Fixed /economics; Endodontics /economics; Fees, Dental; General Practice, Dental /economics; Humans; Metal Ceramic Alloys /economics; Microsurgery /economics; Molar /pathology /surgery; Periodontics /economics; Post and Core Technique /economics; Prosthodontics /economics; Retreatment /economics; Root Canal Therapy /economics; Survival Analysis; Tooth Extraction /economics; Treatment Failure; Treatment Outcome

AccessionNumber

22011001216

Date bibliographic record published

17/08/2011

Date abstract record published

23/01/2012