Dentists’ thresholds for restorative intervention in carious lesions: protocol for a systematic review

Abstract

There is increasing emphasis on less invasive approaches to dental treatment and increasing evidence to support non-intervention and preventive focussed treatment of lesions confined to enamel of the outer third of dentine. However, there is evidence that dentists’ thresholds for intervening has changed along with this evidence more in some countries than in others. The reasons for, and the extent of, this difference are unclear.

This systematic review of the literature aims to collect data relating to dentists’ treatment thresholds and evaluate their thresholds for restorative intervention in carious lesions.

Databases to be searched: Embase, Medline via PubMed, and Web of Science

Trials will be included if the are peer reviewed, observational or survey based with no language, time or quality restrictions being applied. They must investigate decision making by dentists for adults or children and primary or permanent dentitions and report on dentists’ decision making around restorative intervention at which stage of carious lesion progression.

Titles screening, full texts screening and data extraction stages will be carried out independently and in duplicate by both reviewers.

Primary research question: What are dentists’ current thresholds (for carious lesion stage of progression) for carrying our restorative interventions in adults or children (with primary and permanent teeth). The secondary questions are; whether there are any differences in country, over time and to assess whether the trials are prone to distorted findings by comparator choice or reporting ‘spin’.

Registration

PROSPERO registration on 020516

Contributions

NI and FS drafted the manuscript, contributed to the development of the selection criteria, the risk of bias assessment strategy and data extraction criteria. NI and FS developed the search strategy. FS provided statistical expertise. FS and NI provided expertise on caries management. Both authors read, provided feedback and approved the final manuscript.

Amendments

In the event of protocol amendments, the date of each amendment will be accompanied by a description of the change and the rationale.
Support
The authors’ institutions support the execution of this study and no external funding has been received

Introduction
Rationale
Dental caries continues to be an expensive and burdensome global problem (1, 2) despite improvements in prevention. Restorative treatment, removing the carious lesion and replacing tooth substance with a restorative material, has been the mainstay of managing dental caries for over a century. Dental carious lesions are a result of the by-products of the dental biofilm (acids) causing dental hard tissue demineralisation. The presentation of the disease dental caries, is a continuum, extending from lesions confined to the outer aspects of enamel, to those that have progressed to dentine, through to reach the dental pulp. However, not all lesions progress from enamel, even to cavitation, and even for those that do, this progression can be sporadic and slow. Progression rates of caries have been estimated to be almost twice as slow in permanent teeth as primary teeth(3). The rates for carious lesions confined to enamel, transitioning to dentine lesions have been estimated to be in the order of 33 lesions/100 tooth surface-years for primary molars (i.e. of 100 tooth surfaces monitored for 1 year, 33 lesions were expected to progress to reach the dentine) and 21 for permanent molars(4, 5). In addition, there is growing evidence to suggest that, for lesions that are limited to enamel or the outer third of dentine, preventive measures can be successful at arresting the carious lesion and preventing a restorative approach(6, 7).

Prevention has to be the mainstay of approaches to reducing the burden of dental disease at an individual and a societal level. However, invasive (and largely restorative) interventions continue to be required both to stop lesion progression by restoring a cleansable surface and to control pain and infection (8, 9). Management of the disease aims to avoid pain and infection by stopping disease activity (by interfering with factors that led to the disease in the first place) and controlling lesion progression but there is also still a role for restoring any lost tooth substance to improve aesthetics, function and allow the continued health of the tooth.

Traditionally, stopping progress of the disease has involved removal of all diseased dental tissue (the result of the disease) either with hand or rotary instruments (10). Following caries removal, a restorative material or crown is placed. However, less invasive strategies aimed at controlling the biofilm through sealing or constant removal have been investigated over the last 40 years. These have generally proven to be as successful as traditional approaches and less damaging to the tooth and dental pulp (6, 7).
There is conflicting evidence as to how well the restorative treatment planning behaviour of dentists align to the recommended less interventive strategies for managing carious lesions limited to enamel or the outer aspects of dentine (insert the Schwendicke ADR paper). To date, there is no systematic review of this evidence. To gain the most insight into the data, this review will use a trial sequential analysis if appropriate amounts of data can be collected. We will also comprehensively assess the validity of study design and reporting. Given the apparent continued invasive philosophy being adopted and the variability between countries, despite evidence and recommendations to the contrary, this review is essential to assess the current state of dentists’ thresholds for restorative intervention and to investigate factors that might be influencing this. As well as identifying gaps and weaknesses in the literature and informing future studies, this may help develop strategies to reduce intervention levels by identifying areas of good practice which can be further investigated.

Objectives

Our primary objective is to answer the question: What are dentists’ current thresholds (for carious lesion stage of progression) for carrying our restorative interventions in adults or children (with primary and permanent teeth). The secondary objectives are to assess whether there are any differences in country, over time and to assess whether the trials are prone to distorted findings by comparator choice or reporting ‘spin’.

Methods

Eligibility criteria

This systematic review will include trials that:

- are observational or survey based in design. Only peer-reviewed publications will be considered. No language, time or quality restrictions will be applied;
- investigate decision making by dentists for adults or children and primary or permanent dentitions;
- report on dentists’ decision making (clinically, radiographically or using other caries detection tools) around at what stage of carious lesion progression, should there be an intervention to restore rather than manage the carious lesion preventively.

Outcomes
The primary outcomes are to determine:

- The stage of carious lesion presentation (outer enamel, inner enamel, outer third dentine, middle third dentine or inner third dentine) that dentists decide to restore rather than manage preventively.

The secondary outcomes are to determine:

- The differences that exist between countries in dentists' thresholds for restoring carious lesions.
- Other factors that influence dentists' decision making for restoring carious lesions, including patient age, gender, socio-economic status, tooth, primary or permanent dentition.

**Information sources**

**Electronic searches**

We will search Embase, Medline via PubMed, and Web of Science. Moreover, opengrey.eu will be searched to identify accepted, but not published studies. In addition, reference lists of identified full-texts will be screened and cross-referenced. We will contact study authors if required to obtain full-texts.

**Search strategy**

The search strategy has been kept broad to maximize capture of studies as the key words might not be easily detected.

The following three search areas will be developed for each database and combined:

1. (((((restorative) OR restoration) OR invasive) OR drilling) OR cutting) OR filling) AND
2. (((((decision) OR threshold) OR cut-off) OR intervene) OR survey) OR questionnaire AND
3. (((caries) OR carious) OR decay) OR white spot

**Study records**

**Data management**

A piloted spreadsheet will be used for data extraction and management.

**Selection process**

Two authors will independently screen titles and then compare findings. Where there is disagreement, titles will be included to obtain full texts. Full texts will then be assessed
independently after de-duplication. Studies will be included after agreement with consensus in cases of disagreement being reached through discussion.

Data collection process

Data extraction will be performed independently by two reviewers. Disagreements will be resolved through discussion.

Data items

The following items will be collected: Author names, year, characteristics of dentists being investigated (country and other demographics as per study), lesion progression classification system, dentists’ thresholds for carrying out restorative intervention, primary or permanent teeth, adults of children’s teeth, other factors found to influence treatment decision making, authors’ conclusions

Outcomes and prioritisation

The study findings for our primary and secondary outcomes and outcome measures will be extracted.

Spin classification

We will assess spin (11) by applying the spin classification scheme separately for abstract results and conclusions sections as well as main text results, discussion and conclusions sections. Spin will be defined as the authors’ focus on significant secondary outcomes, significant subgroup, secondary outcomes in case of non-significant results. Spin will be classified as high spin (spin results are not considered as uncertain) or low spin (uncertainty acknowledged) (11, 12).

Data synthesis

Data synthesis

We will present a comparison of the data from different studies on dentists' treatment level thresholds by country and by time.

Subgroup analyses

We might carry out subgroup analyses for different dentitions, populations (adult/ children/ age) lesion depths or other factors found to be influencing restorative treatment intervention depending on the availability of data.
Confidence in data

There are likely to be a number of different types of studies. These will be assessed and graded for quality depending on type and in line with the tool recommended by EQUATOR and conclusions framed accordingly (13)
References


