BOOK OF ABSTRACTS

Lebanese Dental Association

13th Annual Convention

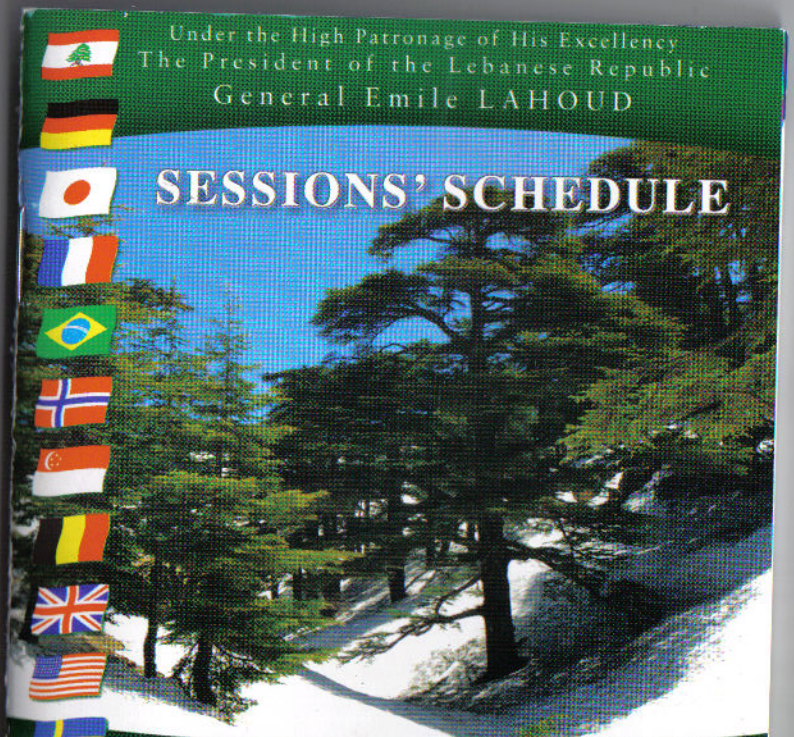
Problem Solving *in* Dentistry

fdi World Dental Federation

August 27 to 30, 2003
Beirut, Lebanon

Under the High Patronage of His Excellency
The President of the Lebanese Republic
General Emile LAHOUD

SESSIONS' SCHEDULE



Lebanese Dental Association

13th Annual Convention

Problem Solving *in* Dentistry

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August 27 to 30, 2003
Beirut, Lebanon

Problem Solving in Dentistry:

Determining restoration longevity

Asbjørn Jokstad

Institute of Clinical Dentistry, University of Oslo, Norway

Stakeholders

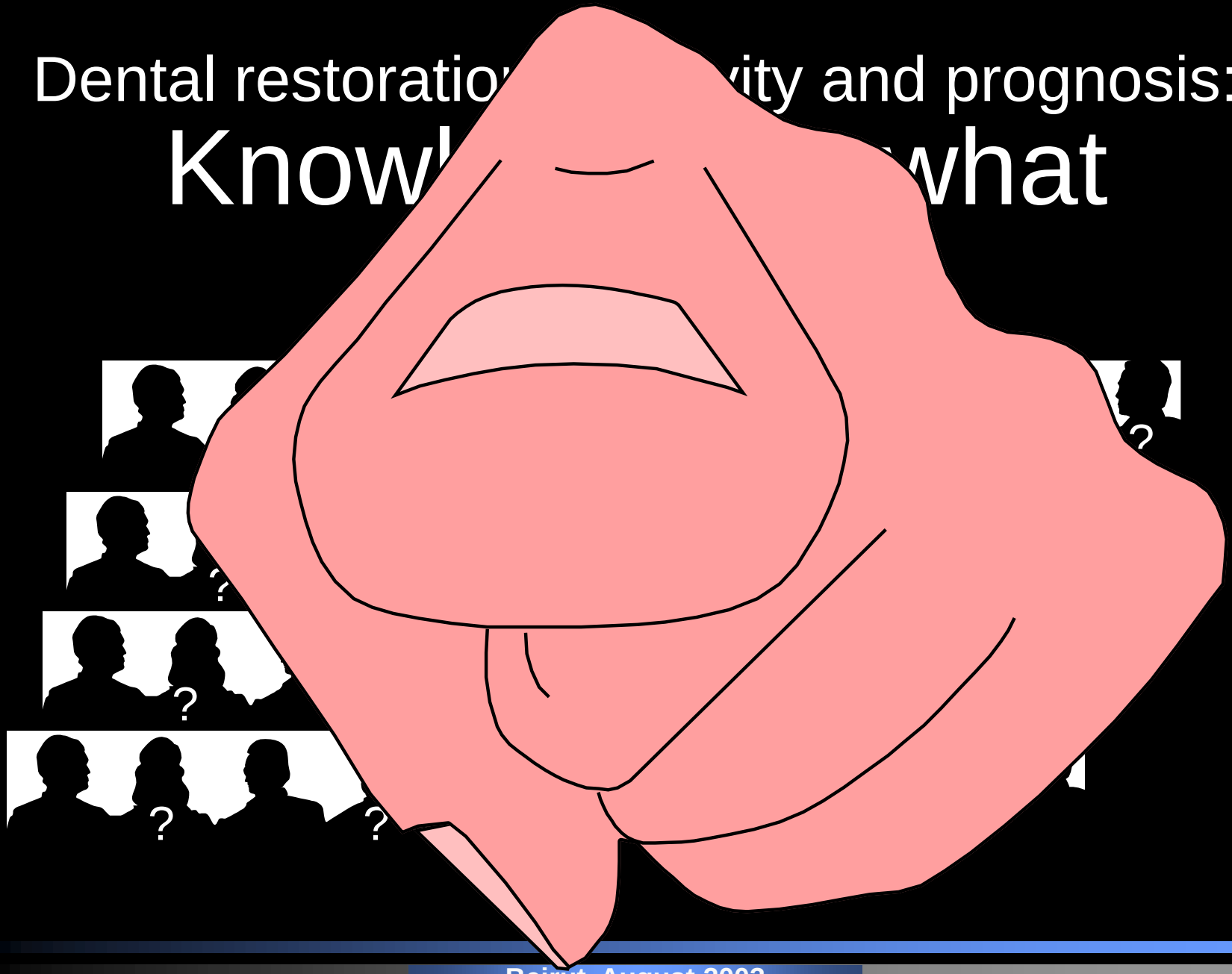
1. Society / public:
   Cost – benefit

2. Manufacturers:
   Develop new, better products

3. Academia:
   ..... exercises?

4. General practitioner:
   Clinical decision making

Dental restoratio ity and prognosis: Know what



1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

Stakeholders:
The General Practitioners

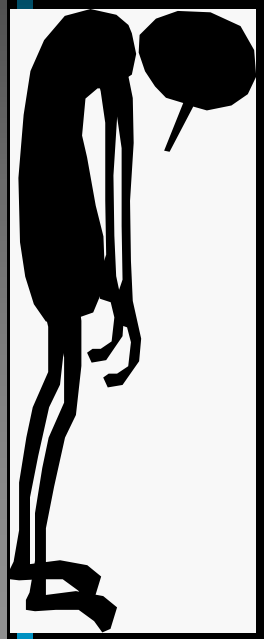
Three plain questions

1. How long will these restorations last?

We would like to know...

1. How long do different restorations last ?
2. Why can’t the dental materials researchers provide the straightforward answers when questioned ?

The daily situation of GPs: An information overload



Advertising
- producers
- colleagues

Dental literature

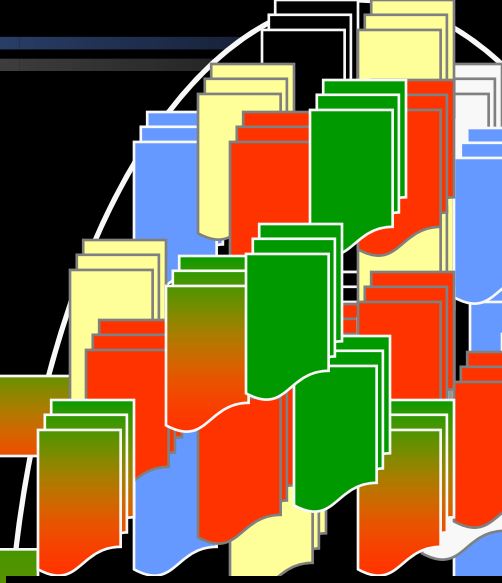
Meetings/ courses

Colleagues

WWW

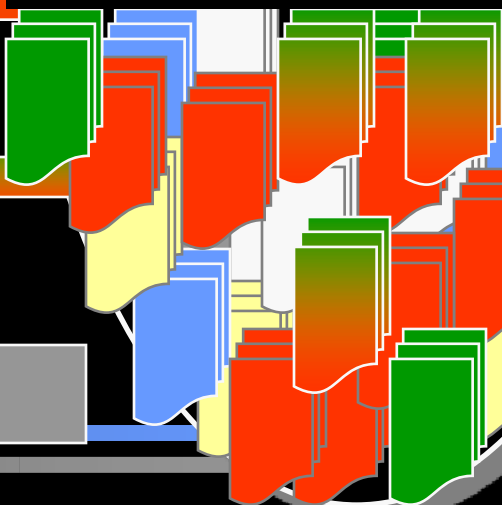
Patients & (-groups)

Popular magazines & Media



Dental science

25 000 articles/y



We would like know...

1. How long do different restorations last ?
2. Why can’t the researchers provide clear answers to general practitioners?
3. Why are most restorations sooner or later replaced by (all the other) general practitioners?

Stakeholders

1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

Society / public agenda

- Which materials work best in general dental practice?
- How can people best avoid having to re-restore teeth?

AIM:

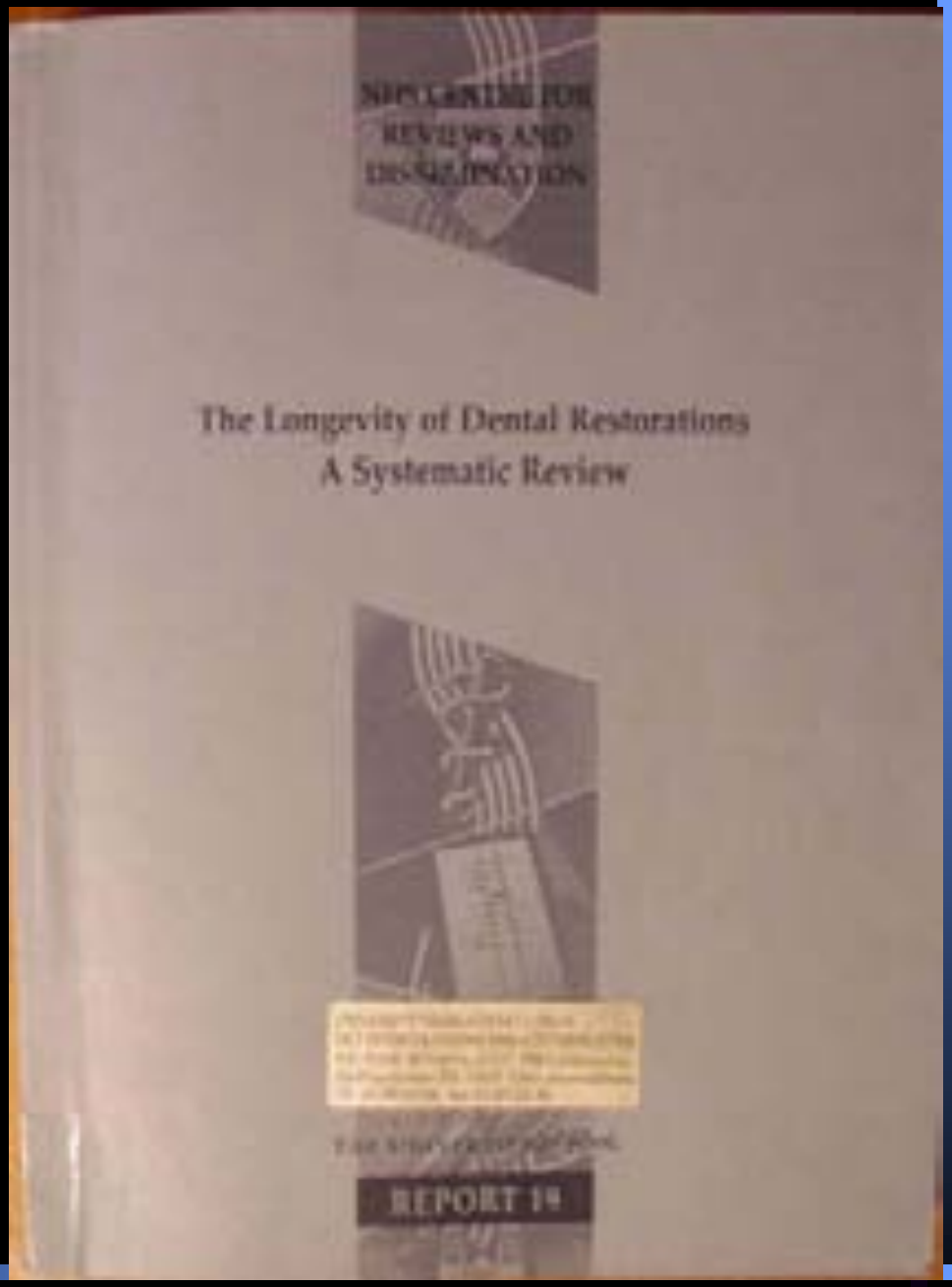
Determine longevity of different dental restoration materials

&

address cost-effectiveness

337 page report

1999.



Effectiveness bulletin

What type of filling? Best practice in dental restorations

B L Chadwick, P M H Dummer, F D Dunstan, A S M Gilmour, R J Jones, C J Phillips, J Rees, S Richmond, J Stevens, E T Treasure

Dental caries (tooth decay) is one of the most common diseases, with approximately 80% of the population in developed countries having experienced the condition. If decay has not been prevented cavities develop. To prevent considerable pain and tooth loss it may be necessary to remove the diseased tissues and restore the cavities (a filling).

Restorations have a limited lifespan and, once a tooth is restored, the filling is likely to be replaced several times in the patient's lifetime.[1] Studies in the UK suggest that much of restorative dentistry is replacement of existing restorations, accounting for around 60% of all restorative work.[2] Similar figures have been found in other parts of Europe,[3,4] and the USA.[5,6] (*Quality in Health Care* 1999;8:202–207)

There is a large choice of materials which can be used for fillings. Many are introduced into the market place and used on patients with limited evidence that they are more effective or robust than existing materials. Consequently, one of the key questions is, all other things being equal, what type of filling is best?

This paper summarises the results of a systematic review of the relative longevity and cost effectiveness of routine intracoronal dental restorations,[7] which formed the basis of a recent issue of *Effective Health Care*.[8]

The reasons for replacing a restoration are numerous and vary with tooth type and restorative material.[9] Once inserted, restorations may fail at variable rates due to various "objective" factors affecting both the failure of the filling material and further decay of the tooth around the filling. These factors include the characteristics of the filling material and effect modifiers related to operator skill and technique, patients' dental characteristics, and the environment around the tooth.

The decision to replace a restoration is also influenced by more subjective factors such as dentists' interpretation of the restoration's condition and the health of the tooth, the criteria used to define failure, and patient demand. These decisions are subject to much variation.[1,10] A lack of standardisation exists, and no generally agreed criteria are used to decide when a restoration requires replacement.[11]

Types of restoration

Tooth restorations may be classified as *intracoronal*, when they are placed within a cavity prepared in the crown of a tooth, or *extracoronal*, when they are placed around (outside) the tooth as in the case of a crown. Intracoronal restorations are usually placed *directly* into the tooth cavity and normally consist of a mouldable material that sets and becomes rigid; the material is retained by the surrounding walls of the remaining tooth tissue. An alternative intracoronal restoration uses an *indirect* technique; here an impression of the cavity is taken and a laboratory constructed inlay is produced and subsequently cemented into the prepared cavity.

The materials currently used to restore intracoronal preparations are: dental amalgam, composite resins, glass ionomer cements, resin modified glass ionomer cements, compomers and cermets, cast gold, and other alloys inlays and porcelain (box 1).

Research methods

The systematic review[7] involved a wide search for studies in any language using many general and specialist databases, handsearching of key dental journals, and searching of abstracts from conference proceedings.[12] Of the 652 relevant papers, 253 (representing 195 studies) had the minimum core of data required for inclusion.

INCLUSION CRITERIA

Use of objective outcome measures

Many authors did not state or use criteria for deciding when a restoration had failed and needed to be replaced. In these studies it is therefore impossible to distinguish between the objective factors influencing longevity (the main aim of the review) and subjective influences. For this reason, to be included, studies were required to have measured outcome (the decision to replace a restoration) using stated criteria.

Study design

Only studies that looked at performance in either experimental or clinical settings were included. The review included randomised controlled trials (RCTs), quasi-experimental

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Accepted 10 May 1999

APRIL 1999 VOLUME 5 NUMBER 2 ISSN: 0965-0288

Effective Health Care

Subtitle: effectiveness of health care interventions for decision making

This bulletin reviews the evidence of the relative longevity and cost-effectiveness of routine dental restorations.

Dental restoration: what type of filling?

- Tooth decay is one of the most common diseases and accounts for almost half of all tooth extractions. The treatment of tooth decay by the placement of simple, direct restorations (fillings) alone costs the NHS in England & Wales £173 million per year.
- Dental restorations do not last forever; over 60% of all restorative dentistry is for the replacement of restorations.
- New restorative materials are often marketed and introduced into practice with limited evidence on their long-term clinical performance.
- Overall, amalgam is the direct restorative material of choice unless aesthetics are important. It lasts longest and is the cheapest.
- The newer generation dentine bonding agents for composite restorations use some form of acidic primer and have better retention rates than earlier generations.
- The use of cermet cements, and the composite and glass ionomer sandwich technique in class II cavities, had high failure rates and cannot be recommended.
- There is significant variation in decision making between dentists. Appropriate criteria for replacement of restorations are needed and dental schools should train dentists in their use in order to reduce unnecessary procedures and improve quality.
- The longevity of restorations carried out in the better quality research studies suggests that routine clinical practice may be producing sub-optimal results. Work is needed to establish means of improving the quality of routine practice, putting in place incentives to promote cost-effective care and identifying the resource implications.

THE UNIVERSITY of York

NHS CENTRE FOR REVIEWS AND DISSEMINATION

Stakeholders

1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

Manufacturers agenda

- How can existing products be improved further?
- How can new products be validated without long and expensive clinical trial data?
  - Validity of in-vitro data to predict clinical performance?
  - Validity of short term clinical observations to predict long term clinical performance?

Stakeholders

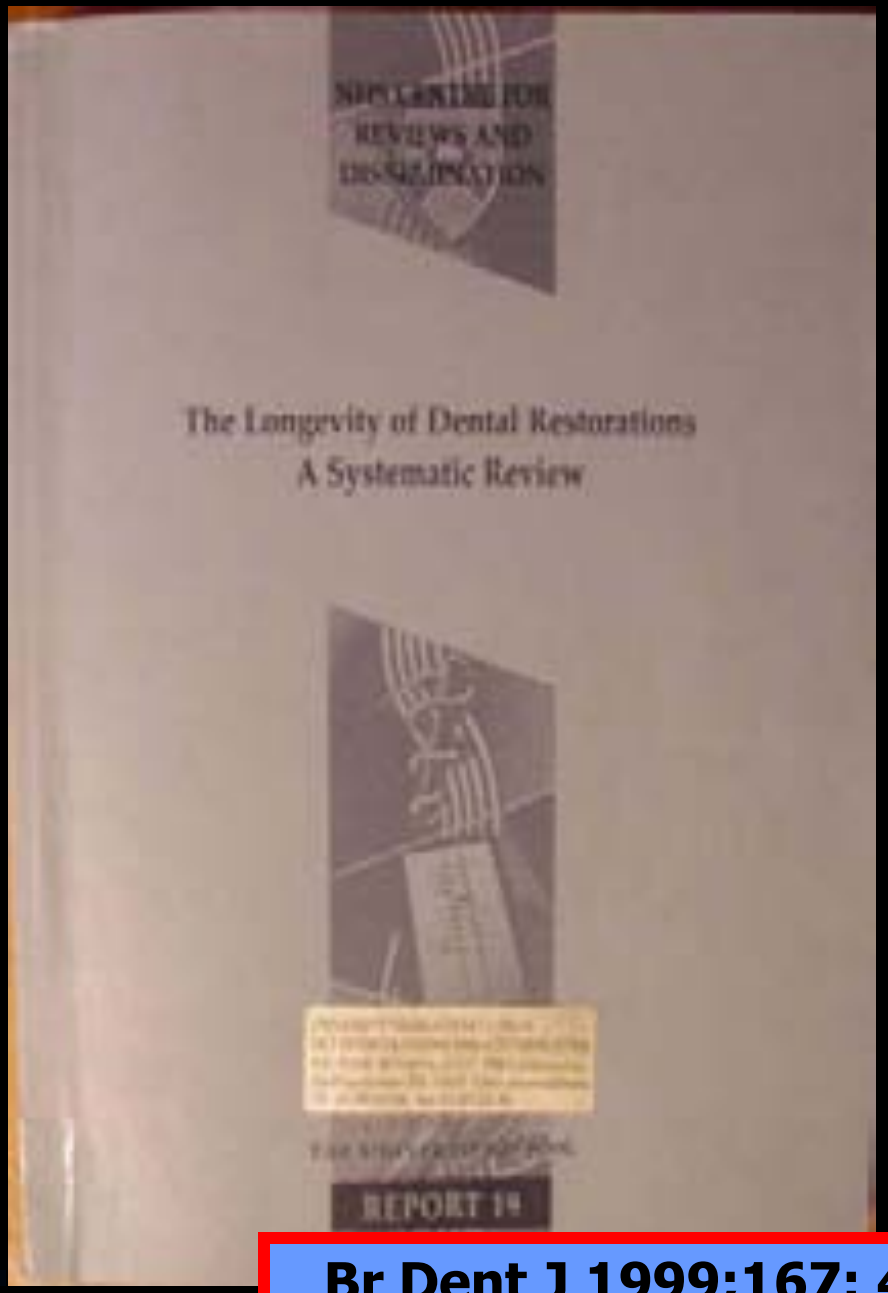
1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

Academia's agenda

- Carry out basic research
- Undertake basic research for manufacturers
- Undertake clinical research for manufacturers
- Engage in clinical research for society
- Educate post-graduates to become researchers

GPs agenda

1. How long do different restorations last? Depending on:
   - Material?
   - Size and intra oral location?
   - Specific products within a dental material category?



REVIEW
dental restorations

How long do routine dental restorations last? A systematic review

M. C. Downer,[1] N. A. Azli,[2] R. Bedi,[3] D. R. Moles,[4] and D. J. Setchell,[5]

Objective To conduct a systematic review of the literature on the longevity of routine dental restorations in permanent posterior teeth, and to identify and examine factors influencing its variability.
Method Accepted guidelines were followed. An advisory group oversaw the project. Simple Class I and Class II amalgam, composite resin, glass ionomer and cast gold restorations were covered. Comprehensive searching of electronic databases, hand-searching, and location of 'grey' literature, generated 124 research reports. These considered relevant were assessed for validity and quality according to agreed criteria. The analysis was descriptive.
Results Eight of 58 relevant research reports were categorised, according to agreed criteria, as being of satisfactory validity and quality. They suggested that 50% of all restorations last 10 to 20 years, although both higher and lower median survival times were reported. The findings were supported by the totality of studies reviewed. However, variability was substantial. Restoration type, materials, the patient, the operator, the practice environment and type of care system appeared to influence longevity.
Conclusions Many studies were imperfect in design. Those considered to be the most appropriate for analysis were too limited to undertake a formal statistical exploration. Therefore there remains a need for definitive randomised controlled trials of restoration longevity, of sound design and adequate power, employing standardised assessments and appropriate methods of analysis.

The durability, or longevity, of a dental restoration is clearly a salient factor in determining its effectiveness as a presumed long-term treatment for caries. Yet despite the very large number of fillings placed annually by the profession, how long a routine restoration can, or should, be expected to stay functionally intact remains a matter of uncertainty. In order to collate, assess and draw conclusions from the available evidence, it was evident that a systematic review of the literature on longevity should be undertaken, no previous exercise of this kind having been identified. A comprehensive search was therefore initiated which revealed a body of work that might be suitable for inclusion.[1–124] This paper aims to provide a condensed, easily assimilable version of the full review,[125] the objectives of which were to establish from research reports of satisfactory quality the longevity of different types of routine dental restoration in permanent posterior teeth, and its variability; and to identify and examine factors (referred to as effect modifiers) influencing the durability of restorations.

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Method

Conduct of the review

The review was conducted in general accordance with guidelines promulgated by the NHS Centre for Reviews and Dissemination (CRD),[126] and the Cochrane Collaboration.[127] An advisory group was formed at the outset to assist the principal researcher (NAA) and act as consultants to the project. The group consisted of the remaining authors of the current report whose collective knowledge was considered to cover the areas of relevant expertise. Its task was to decide the scope of the review and the specific questions to be addressed; to approve and finalise the protocol; to monitor progress in identifying studies and deciding on their suitability for inclusion (assessment of validity); to discuss the proposals for analysis of the material and completion of the review; and to agree the final report. A meeting of the group and principal researcher took place at each stage. In addition, advice and guidance was obtained from the Systematic Review Unit at the Institute of Child Health, University College London.

Inclusion and exclusion criteria

Resources were limited and it was necessary to place some constraints on the scope of the review. Evaluations of the clinical performance of Class I (occlusal) and Class II (mesial-occlusal, distal-occlusal, mesial-occlusal-distal) restorations in permanent teeth, the commonest type of conservative treatment, predominate in the literature. It was therefore determined that the review should be confined to an assessment of the longevity of simple amalgam, composite resin, glass ionomer and cast gold restorations of these two types. A simple restoration was defined as one not requiring any form of additional retention measures.

Search strategy

Through a comprehensive search, an attempt was made to identify all relevant studies irrespective of language. Available electronic databases, MEDLINE, EMBASE, CINAHL, DISSERTATION ABSTRACTS and ERIC were searched from their date of inception together with ISTP. Conference proceedings were searched using the citation index SCISEARCH. The subject headings or key components used included *dental restoration, longevity, failure, durability, survival analysis, and life table analysis*. In addition, the Cochrane Controlled Trials Register (CCTR) in the Cochrane Library (1998 Issue 2) was scrutinised for any relevant trials and cross checked with those already retrieved.

Bibliographies of research reports identified through the search

Br Dent J 1999;167: 432-9.

Beirut, Aug

2. International ESPE Dental Symposium

150 Experts Discuss "Adhesive Dentistry"

2 International ESPE Dental Symposium Philadelphia 2000

Adhesive Dentistry – Clinical and Microscopic Aspects

Restorative materials: An evidence based review

Reviewing more than 500 clinical studies, Dr. Hickel analyzes the longevity rates and reasons for failure of direct resin-based composites, amalgam, and glass-ionomer cement restorations in Class I and Class II posterior cavities.

By Professor Dr. Reinhard Hickel (as presented at the 2nd International ESPE Dental Symposium in Philadelphia, May 2000)

Improved care and a dramatic decrease in caries in developed countries coupled with patient demand for increased esthetics are changing the face of dentistry. New restorative materials and new techniques also are significantly affecting the way dentists practice.

No change has been more dramatic than the decreased use of amalgam for posterior restorations. Sparked in part by controversy over amalgam's environmental impact and biocompatibility, clinicians in the last 15 years have been abandoning amalgam in favor of the newer tooth-colored restoratives.

In Germany, for example, three-quarters of all cavities in 1985 were restored using amalgam1; 10 years later, amalgam accounted for only 30% of the restorations placed.

In other countries the decline has been even more dramatic. By 1985 only 40% of all restorations placed by Swedish dentists were amalgam. And, last year politicians there announced their decision that insurance companies would not pay for amalgam restorations beginning in the year 2001.2

But some countries have been slower to transition to the contemporary restoratives. In 1988 in the United States, 85% of all fillings placed were amalgam;2 nine years later, 58% of fillings were still being restored with amalgam.

U.S. dentists are not alone. A survey3 conducted in 1999 by ESPE, under the guidance of Paul S. Casamassimo, Naim Wilson, and myself, and sent to a total of 14,000 dentists in 10 European countries and the United States, asked dentists to indicate which restorative material they most often used in posterior Class I and Class II

International Dental Journal (2001) 51, 117–158

Quality of dental restorations

FDI Commission Project 2-95*

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*Project initiated and report approved by FDI Commission

A major undertaking for general practitioners is the provision and assessment of dental restorations. High quality restorative therapy encompasses several key elements that fulfil specific criteria. Enhanced knowledge of these elements is a significant step toward improvement of the quality of restorative dental care[1].

Several studies have demonstrated that a major component of a dentist's work is re-restoration of previously restored teeth. Collectively this represents a worldwide billion-dollar industry[2]. Estimates of annual expenditures for 'replacement dentistry' are US$5000m (USA, 1984)[3], NLG600m (Netherlands, 1988)[4], and GB£100m in the public sector alone in UK in 1991[5].

Quality of dental restorations encompasses wide-ranging clinical considerations, which are reflected by many strategies used to explore the issue. Such strategies include appraisals of criteria for quality or causes of failures of restorations[6,7], health gains through improvement of clinical practice[8], standards of dental care and practice[9–11], and methods for evaluating restoration performance[12].

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0020-6539/01/03117-42

Int Dent J 2001; 51: 117-158

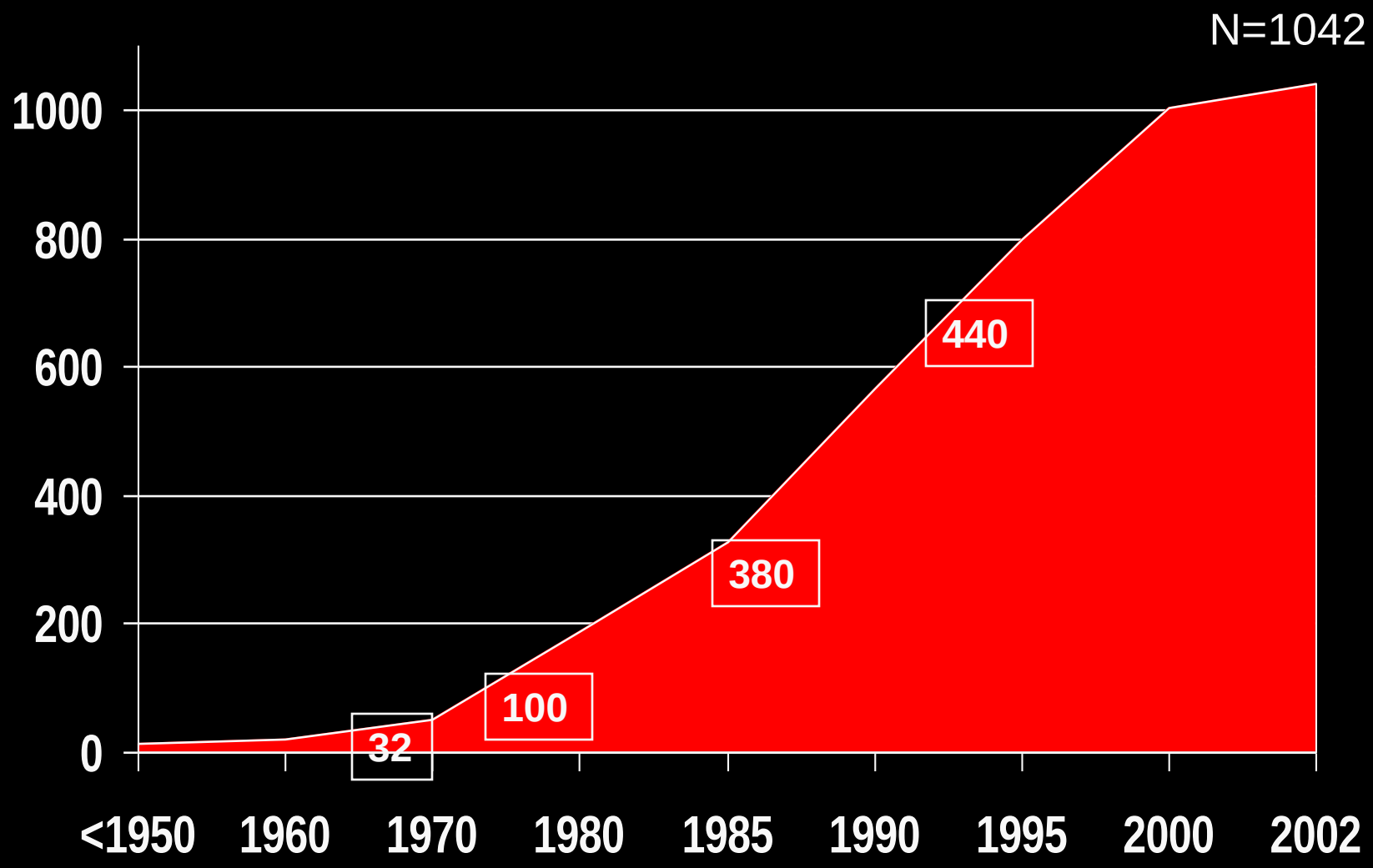
AIM: Review all factors that may affect the quality of a dental restoration

298 references

GPs agenda

1. How long do different restorations last? Material, products, size, intra oral location?
2. Why can’t the dental materials researchers provide the straightforward answers when questioned ?

Number of clinical trials



Stakeholders

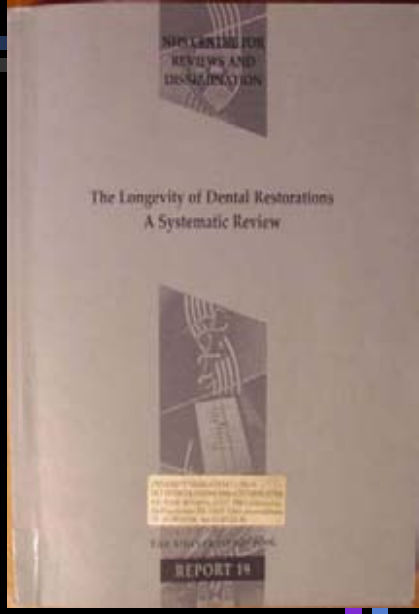
1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

22

Academia's agenda

- Carry out basic research
- Undertake research for manufacturers
- Engage in clinical research for society
- Educate post-graduates to become researchers
- Exercises??!

14000 papers -> 5675 studies



		Weaker outcome measures → → → Stronger outcome measures					
Weaker study design	Outcome measure / Study design	Study design code number	Restoration replacement (subjective opinion)	Restoration replacement (use of criteria but no training)	Restoration replacement (use of any criteria, training and / or calibration, include USPHS where not two examiners etc)	Restoration replacement (valid outcome, criteria, training and calibration, include USPHS where properly used)	Restoration Failure (without previous intervention)
	Outcome measure code nos.		1	2	3	4	5
↓	Descriptive studies / Reports of expert studies / Reports of expert committees	1	X	X	X	X	X
↓	Case studies	1	X	X	X	X	X
↓	Retrospective case series	2	X	X	X	X	X
↓	Prospective case series	3	X	I	I	I	I
↓	Retrospective study with concurrent controls	4	X	I	I	I	I
↓	Prospective study with historical controls	5	X	I	I	I	I
↓	Prospective study with concurrent controls	6	X	I	I	I	I
↓	Other controlled trial	7	X	I	I	I	I
Stronger study design	Well designed randomised controlled trial	8	X	I	I	I	I

X indicates that studies so classified were excluded from the review
I indicates that studies so classified were included in the review if it was possible to extract the necessary data

652 studies
↓
253 studies
↓
195 studies

ELSEVIER

Journal of Dentistry 29 (2001) 155–161

Journal of Dentistry

www.elsevier.com/locate/jdent

Challenges with studies investigating longevity of dental restorations—a critique of a systematic review

B. Chadwick[a,*], E. Treasure[a], P. Dummer[a], F. Dunstan[a], A. Gilmour[a], R. Jones[a], J. Stevens[a], J. Rees[c], S. Richmond[a]

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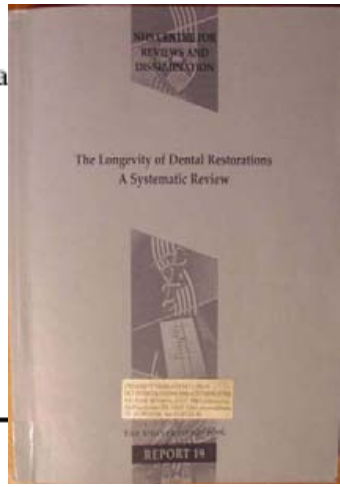
Received 12 June 2000; accepted 10 January 2001



Abstract

Objectives: A systematic review is a method of evaluating the published and unpublished literature relating to a specific area or topic. The objectives of this paper are to identify and discuss problems encountered in synthesising the available literature; and to make recommendations for the future conduct and reporting of clinical trials that aim to determine the longevity of dental restorations.

Data sources: Studies were identified by a wide search of published and unpublished material in any language using a large number of general and specialist data bases, hand searching of key dental journals and searching of abstracts from conference proceedings.

Study selection: Pre-defined inclusion criteria based on objective outcome measures of restoration longevity and study designs were applied to determine study selection.

Conclusions: A review of the longevity of dental restorations completed recently encountered substantial problems in designing an appropriate protocol to address this issue. The review found that many of the factors reported previously as affecting restoration longevity could not be confirmed using the agreed systematic review protocol that incorporated an objective study design. Further, the multiplicity of study designs, and reporting methods found in the literature made meta-analyses impossible. A proforma is proposed in order to aid the design of future research into the longevity of restorations.

Table 1 Criteria of assessment of validity and quality of studies for inclusion in the review

Citation and reference	Assessment criteria A	B	C	D	E	F	G	H	I
Hamilton *et al.* (1983)[17]	1	✓		✓	✓		✓		✓ (10)
Hendriks *et al.* (1985)[19]	1	✓				✓	✓		
Wilson *et al.* (1996)[57]	1	✓		✓		✓			
Welbury *et al.* (1990)[55]	2			✓		✓			✓ (8)
Wilson & Norman (1991)[56]	2		✓	✓	✓	✓	✓		✓ (10)
Akerboom *et al.* (1993)[1]	3			✓	✓	✓	✓		
Davies (1984)[7]	4	✓				✓			
Elderton (1983)[12]	4	✓		✓	✓			✓	✓ (8)
Jokstad & Mjor (1991)[21]	4	✓			✓	✓	✓	✓	✓ (8)
Mjor & Jokstad (1993)[31]	4			✓	✓		✓		
Nordbo *et al.* (1998)[38]	4				✓		✓		
Osborne & Norman (1990)[40]	4	✓				✓	✓		
Osborne *et al.* (1991)[41]	4	✓			✓	✓	✓		
Smales (1991)[50]	4			✓		✓	✓	✓	✓ (9)
Van Dijken (1991)[53]	4			✓	✓	✓	✓		✓ (10)
Allan (1977)[2]	5			✓					✓ (8)
Bentley & Drake (1986)[3]	5		✓	✓	✓	✓	✓	✓	✓ (8)
Bjertness & Sonju (1990)[4]	5			✓				✓	✓ (8)
Crabb (1981)[6]	5			✓	✓				✓ (10)
Dawson & Smales (1992)[8]	5			✓	✓	✓		✓	✓ (8)
Dawson & Smales (1992)[9]	5			✓	✓	✓		✓	✓ (8)
Drake (1988)[10]	5			✓	✓	✓	✓	✓	✓ (8)
Drake (1988)[11]	5			✓	✓	✓	✓	✓	✓ (8)
Gray (1976)[16]	5			✓	✓		✓	✓	✓ (8)
Hawthorne & Smales (1997)[18]	5	✓		✓	✓	✓		✓	✓ (8)
Hunter (1985)[20]	5			✓	✓	✓		✓	✓ (8)
Lavelle (1976)[24]	5				✓				✓ (8)
Letzel *et al.* (1997)[26]	5	✓		✓	✓	✓		✓	✓ (10)
Letzel *et al.* (1989)[25]	5			✓		✓	✓		✓ (10)
Mahmood & Smales (1994)[27]	5			✓	✓	✓		✓	✓ (8)
Mayhew (1995)[28]	5	✓			✓	✓		✓	✓ (8)
Paterson (1984)[42]	5			✓		✓		✓	✓ (8)
Robbins & Summit (1988)[47]	5	✓	✓	✓			✓	✓	✓ (8)
Robinson (1971)[48]	5			✓	✓				✓ (8)
Smales *et al.* (1991)[51]	5			✓			✓	✓	✓ (8)
Smales (1991)[52]	5			✓		✓	✓	✓	✓ (9)
Walls *et al.* (1985)[54]	5			✓		✓		✓	✓ (8)
Meeuwissen (1985)[130]	5			✓		✓		✓	✓ (10)
Burke *et al.* (1998)[5]	6				✓	✓	✓		✓ (8)
Friedl *et al.* (1994)[14]	6				✓	✓	✓		✓ (8)
Friedl *et al.* (1995)[15]	6				✓	✓	✓		✓ (8)

A Design type — hierarchical classification

Satisfactory investigations
1 Randomised controlled trials
2 Non-randomised controlled trials
3 Longitudinal experimental clinical studies
4 Longitudinal prospective studies

Less satisfactory investigations
5 Longitudinal retrospective studies

Least satisfactory investigations
6 Cross-sectional studies
7 Reports consisting only of an abstract

B Was the study described as randomised? Yes/no

C Were the examiners calibrated? (studies with one or more assessors) Yes/no

D Were the terms 'failure' and 'survival' of restorations clearly defined? Yes/no

E Were the criteria for replacement clearly defined? Yes/no

F Were effect modifiers considered? Yes/no

G Was the assessment based on clinical examinations? Yes/no

H Was the effect of censoring data considered? Yes/no

I Appropriate outcome measure used? Yes/no

8 Median survival time (MST) or median longevity
9 Cumulative survival rate
10 Survival/failure rate

How long do routine dental restorations last? A systematic review

M. C. Downer,[1] N. A. Azli,[2] R. Bedi,[3] D. R. Moles,[4] and D. J. Setchell,[5]

Objective To conduct a systematic review of the literature on the longevity of routine dental restorations in permanent posterior teeth, and to identify and examine factors influencing its variability.
Method Accepted guidelines were followed. An advisory group oversaw the project. Simple Class I and Class II amalgam, composite resin, glass ionomer and cast gold restorations were covered. Comprehensive searching of electronic databases, hand-searching, and location of 'grey' literature, generated 124 research reports. Those considered relevant were assessed for validity and quality according to agreed criteria. The analysis was descriptive.
Results Eight of 58 relevant research reports were categorised, according to agreed criteria, as being of satisfactory validity and quality. They suggested that 50% of all restorations last 10 to 20 years, although both higher and lower median survival times were reported. The findings were supported by the totality of studies reviewed. However, variability was substantial. Restoration type, materials, the patient, the operator, the practice environment and type of care system appeared to influence longevity.
Conclusions Many studies were imperfect in design. Those considered to be the most appropriate for analysis were too limited to undertake a formal statistical exploration. Therefore there remains a need for definitive randomised controlled trials of restoration longevity, of sound design and adequate power, employing standardised assessments and appropriate methods of analysis.

The durability, or longevity, of a dental restoration is clearly a salient factor in determining its effectiveness as a presumed long-term treatment for caries. Yet despite the very large number of fillings placed annually by the profession, how long a routine restoration can, or should, be expected to stay functionally intact remains a matter of uncertainty. In order to collate, assess and draw conclusions from the available evidence, it was evident that a systematic review of the literature on longevity should be undertaken, no previous exercise of this kind having been identified. A comprehensive search was therefore initiated which revealed a body of work that might be suitable for inclusion.[1–124] This paper aims to provide a condensed, easily assimilable version of the full review,[125] the objectives of which were to establish from research reports of satisfactory quality the longevity of different types of routine dental restoration in permanent posterior teeth, and its variability; and to identify and examine factors (referred to as effect modifiers) influencing the durability of restorations.

Method

Conduct of the review

The review was conducted in general accordance with guidelines promulgated by the NHS Centre for Reviews and Dissemination (CRD),[126] and the Cochrane Collaboration.[127] An advisory group was formed at the outset to assist the principal researcher (NAA) and act as consultants to the project. The group consisted of the remaining authors of the current report whose collective knowledge was considered to cover the areas of relevant expertise. Its task was to decide the scope of the review and the specific questions to be addressed; to approve and finalise the protocol; to monitor progress in identifying studies and deciding on their suitability for inclusion (assessment of validity); to discuss the proposals for analysis of the material and completion of the review; and to agree the final report. A meeting of the group and principal researcher took place at each stage. In addition, advice and guidance was obtained from the Systematic Review Unit at the Institute of Child Health, University College London.

Inclusion and exclusion criteria

Resources were limited and it was necessary to place some constraints on the scope of the review. Evaluations of the clinical performance of Class I (occlusal) and Class II (mesial-occlusal, distal-occlusal, mesial-occlusal-distal) restorations in permanent teeth, the commonest type of conservative treatment, predominate in the literature. It was therefore determined that the review should be confined to an assessment of the longevity of simple amalgam, composite resin, glass ionomer and cast gold restorations of these two types. A simple restoration was defined as one not requiring any form of additional retention measures.

Search strategy

Through a comprehensive search, an attempt was made to identify all relevant studies irrespective of language. Available electronic databases, MEDLINE, EMBASE, CINAHL, DISSERTATION ABSTRACTS and ERIC were searched from their date of inception together with ISTP Conference proceedings were searched using the citation index SCISEARCH. The subject headings or key components used included *dental restoration, longevity, failure, durability, survival analysis, and life table analysis*. In addition, the Cochrane Controlled Trials Register (CCTR) in the Cochrane Library (1998 Issue 2) was scrutinised for any relevant trials and cross checked with those already retrieved.

Bibliographies of research reports identified through the search

[1]*Emeritus Professor,* [2]*Postgraduate Student,* [3]*Professor,* [4]*Clinical Lecturer, National Centre for Postgraduate Oral Health,* [5]*Head of Conservation Department, Eastman Dental Institute for Oral Health Care Sciences, 256 Grey's Inn Road, London WC1X 8LD*

Received 22.02.99; accepted 04.08.99
© British Dental Journal 1999; 187: 432–439

1: Am J Dent 2002 Feb;15(1):26-30

Related Articles, Books, LinkOut

Evaluation of published clinical studies for reproducibility, comparability and adherence to evidence-based methods.

Patrick S, Hofer E, Lutz F.

Department of Preventive Dentistry, Periodontology and Cariology, Dental Institute, Zurich University, Switzerland. schmidli@zzmk.unizh.ch

PURPOSE: To evaluate the "Materials and Methods" of long-term clinical studies in relation to documentation, reproducibility and comparability with and without employing the systematic methods of evidence-based medicine. MATERIALS AND METHODS: The "Materials and Methods" sections in 45 clinical long-term published studies of direct posterior resin-based composite restorations were evaluated for their use of systematic methods of evidence-based medicine. The search was limited to the years 1988-1997, using the key words "clinical study/evaluation/results/report, long-term, in vivo, posterior, Class I/II, composite, restoration". Special attention was directed to comparisons of the underlying documentation, descriptions of the operative techniques used, and their reproducibility. In addition, an evidence-based search was carried out using the Internet PubMed interface for MEDLINE, using identical synonyms, to identify studies with high levels of quality of evidence. Documentation, reproducibility, and comparability of "Materials and Methods" were also evaluated. RESULTS: Results revealed how difficult it is to interpret results based on tenuous premises, subjective standards, and inadequate study designs. Only one article could be identified when the search was limited to "humans" and "randomized clinical trials". None of the articles, even when fulfilling the highest quality of evidence, showed sufficient or satisfactory quality of reproducibility in their descriptions in Materials and Methods.

PMID: 12074225 [PubMed - in process]

Stakeholders

1. Society / public
   Cost – benefit
2. Manufacturer
   Develop new, better products
3. Academia
   ..... exercises?
4. General practitioner
   Clinical decision making

22

Academia's agenda

- Carry out basic research
- Undertake research for manufacturers
- Engage in clinical research for society
- Educate post-graduates to become researchers
- Exercises??!

Stakeholders

1. Society / public
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22

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- Carry out basic research
- Undertake research for manufacturers
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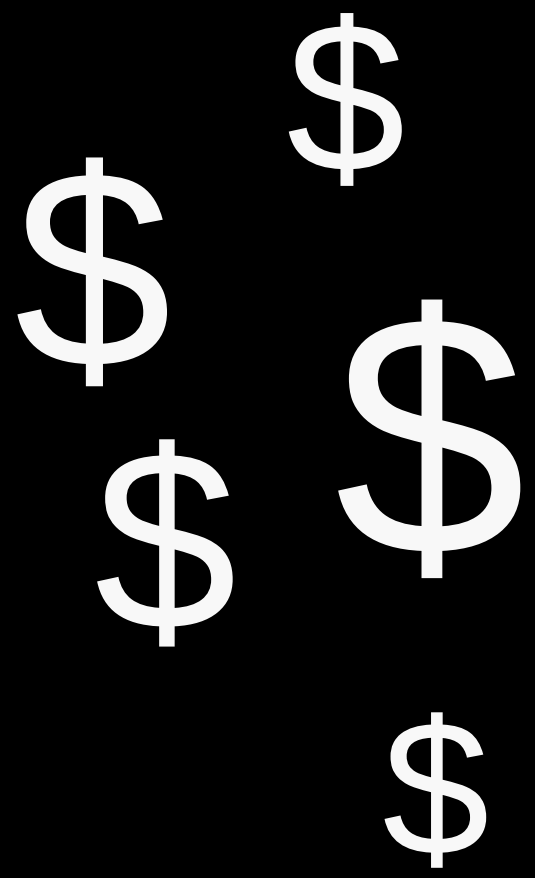


Who brings in the research money?

- Carry out basic research
- Undertake research for <u>manufacturers</u>
- Engage in clinical research for <u>society</u>
- Educate post-graduates to become researchers
- Exercises

Manufacturers and society have different interests:

What is the potential of a new or modified material?

i.e. all variables must be controlled to avoid confounding

How do different materials perform in practice?

GPs agenda

1. How long do different restorations last ? Material, products, size, intra oral location?
2. Why can’t the researchers provide clear answers to general practitioners?
3. Why are most restorations replaced - sooner or later - by all other general practitioners?

Table 1 Factors influencing the decision to restore

a) Possible objective influences

General patient factors

- Exposure to fluoride
- Caries status
- General health
- Parafunction
- Age (particularly child/adult)
- Xerostomia
- Socio-economic status
- Diet

Tooth factors

- Tooth location/type/size
- Cavity design/type
- Dentition
- Occlusal load
- Tooth quality e.g. hypoplasia

Operator and restoration process factors

- Material type
- Physical properties
- Quality of finish
- Moisture control
- Anaesthesia during restoration
- Expertise
- Training

b) Subjective factors

- Incentives (payment structure: salaried, government funded, private, insurance)
- Clinical setting (university, private practice, general dental practice, specialist practice, field trial)
- Country (local treatment fashions)
- Clinician's diagnostic, treatment and maintenance philosophy (influenced by training)
- Patient preferences

What takes place during a treatment decision?

- A consideration if more good than harm is done by replacing restorations, i.e.

  a risk-benefit analysis

- What must an examination include so a risk-benefit analysis can be carried out?
- Appraisal of the presence or absence of markers of oral disease
- Error to focus attention on the appearance of the restorations.

Dental restorations and prognosis

a. Observe?
or
b. Repair?
or
c. Replace?

Pain

Tissue damage

Integrity
- Pulp
- Caries risk
- Function

Replicate

Dental restorations and prognosis

Alternatives:

a. Observe

or

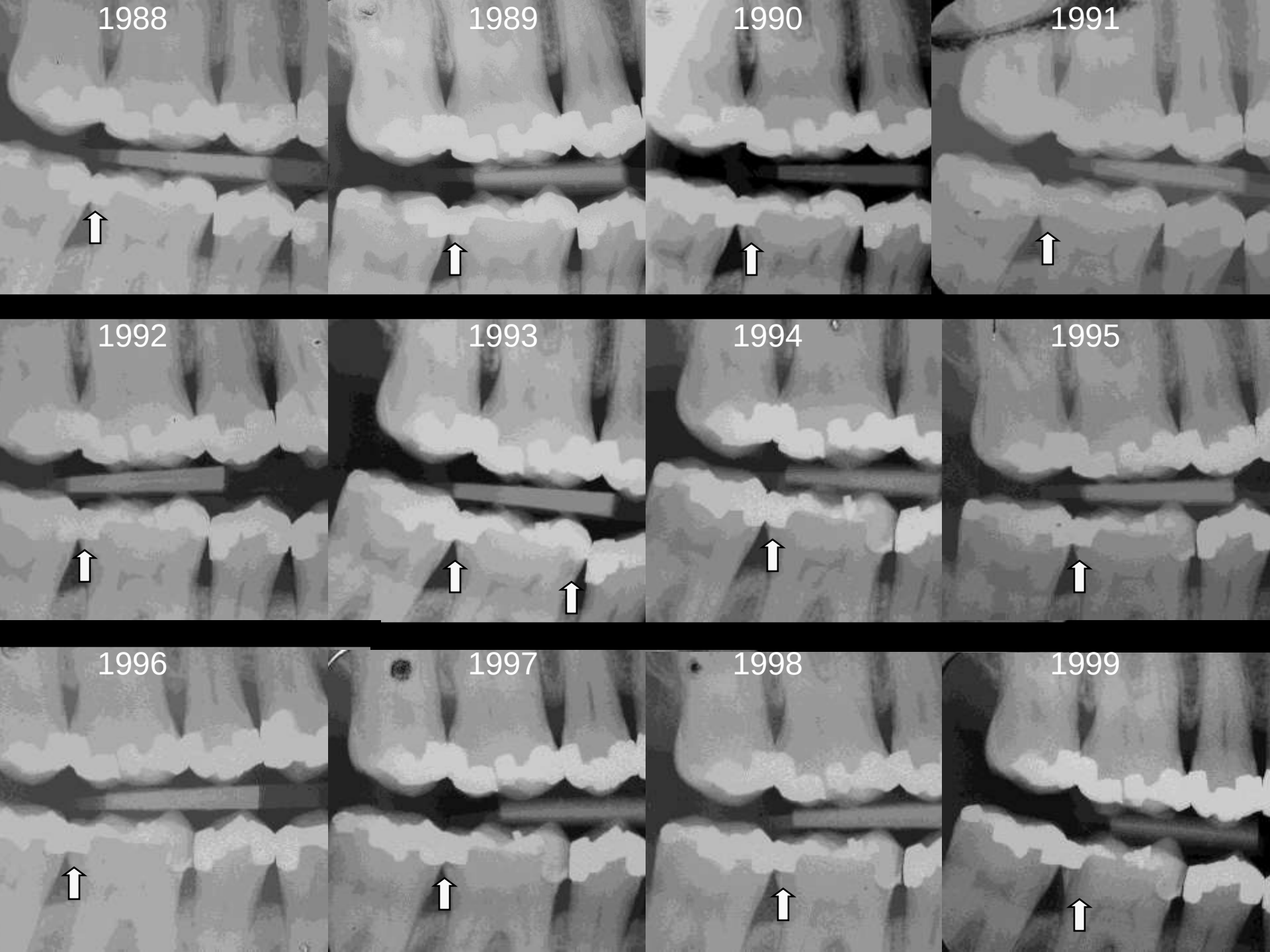
b. Repair

or

c. Replace

Pain ✓ , Tissue damage ✓

Integrity ✓ Pulp ✓ Caries risk ✓ Function ✓ Replicate ✓

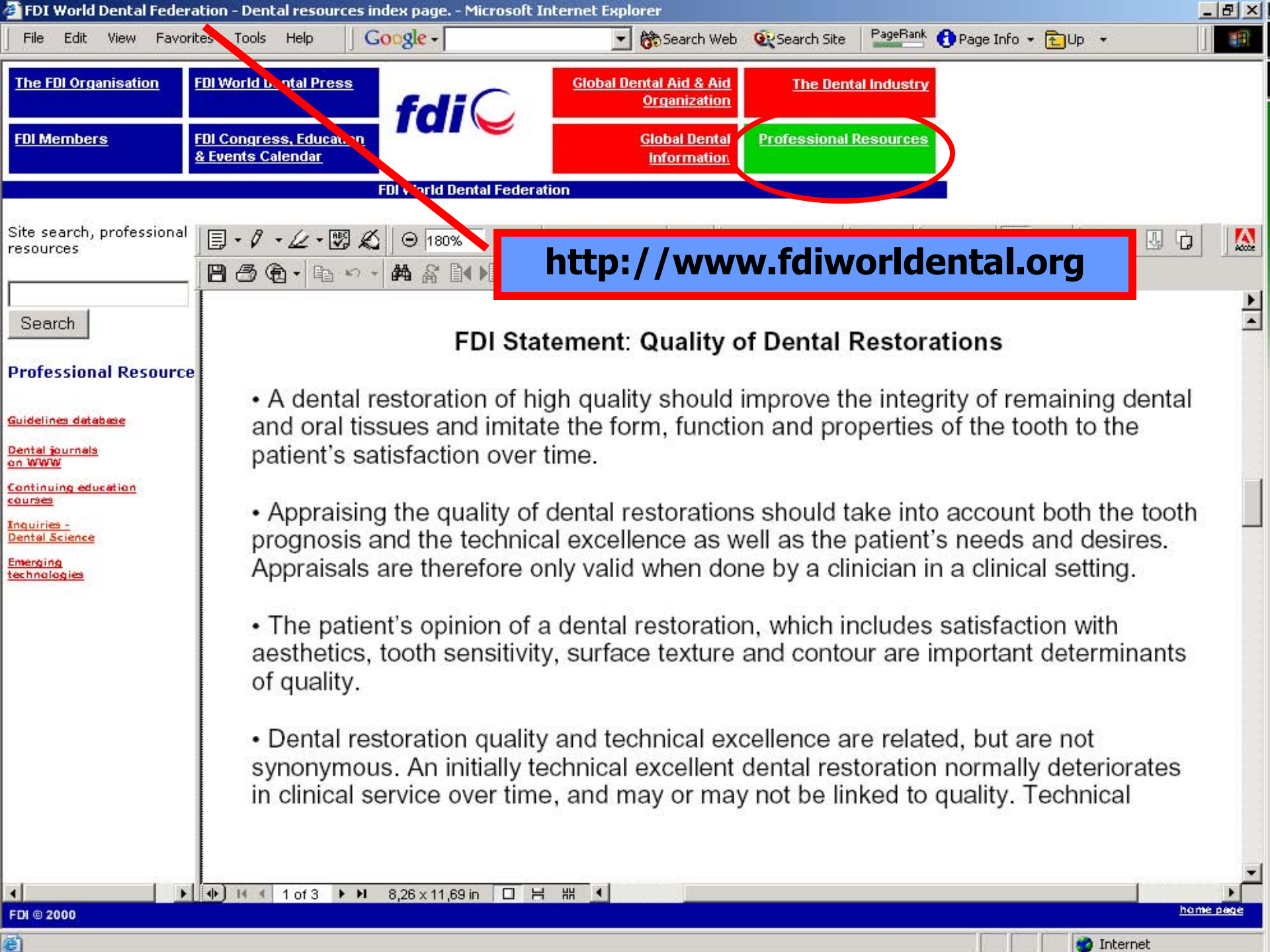

1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

Stepwise risk assessment

1. Overall risk profile for oral disease
2. Key risk markers of oral disease
3. Pathogenic conditions and risk markers of progressive oral disease
4. The technical excellence of the restoration in context with an estimate of possible risk of future pain, damage to supporting tissues and jeopardised integrity of function and remaining tooth tissue, e.g. damage to pulp & new caries

“Longevity data”

Numerical measures of the quality and longevity of dental restorations can be regarded simply as a consequence of either a correct or an incorrect treatment decision approach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FDI Statement: Quality of Dental Restorations
• A dental restoration of high quality should improve the integrity of remaining dental and oral tissues and imitate the form, function and properties of the tooth to the patient's satisfaction over time.
• Appraising the quality of dental restorations should take into account both the tooth prognosis and the technical excellence as well as the patient's needs and desires. Appraisals are therefore only valid when done by a clinician in a clinical setting.
• The patient's opinion of a dental restoration, which includes satisfaction with aesthetics, tooth sensitivity, surface texture and contour are important determinants of quality.
• Dental restoration quality and technical excellence are related, but are not synonymous. An initially technical excellent dental restoration normally deteriorates in clinical service over time, and may or may not be linked to quality. Technical
1 of 3
8,26 x 11,69 in
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home page
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Age of restorations

- Replaced restorations (Retrospective)

Age of replaced restorations

Mjör et al.	2000	9805
Mjör et al.	2002	8395
Mjör et al.	2000	6761
Burke et al.	1999	4608
Friedl et al.	1995	3375
Burke et al.	2001	3196
Bay	1982	2291
MacInnis et al.	1991	2280
Burke et al.	2002	2099
Mjör & Moorhead	1998	2035

Age of restorations

- Replaced restorations (Retrospective)
- Restorations in situ (Retrospective)

How old are these restorations?

1: Acta Odontol Scand 1994 Aug;52(4):234-42

Related Articles, Books, LinkOut

The age of restorations in situ.

Jokstad A, Mjor IA, Qvist V.

Dental Faculty, University of Oslo, Norway.

In a cross-sectional survey the age of restorations in situ was recorded in three patient groups. Group A were randomly examined regular attenders, group B were irregular attenders randomly chosen from patient treatment records, and in group C the age of posterior gold and composite resin restorations was recorded in selected regular attenders. The study material included 8310 restorations in group A, 1281 in group B, and 500 restorations in group C. The three materials amalgam, composite, and gold accounted for more than 90% of all restorations. In group A 3.3% of the restorations were scheduled for replacement. The most prevalent reasons for replacement were secondary caries, bulk fractures of the restoration, and tooth fractures. The median age of the failed restorations was fairly similar to the median age of the acceptable restorations in situ among the regular patients (group A). The data indicate median ages of 20 years for gold restorations, 12-14 years for amalgam restorations, and 7-8 years for composite resin restorations. The restoration ages were influenced by the type and size of the restoration, the restorative material used, and possibly also the intra-oral location of the restorations.

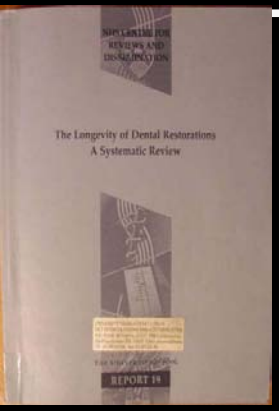
Publication Types:

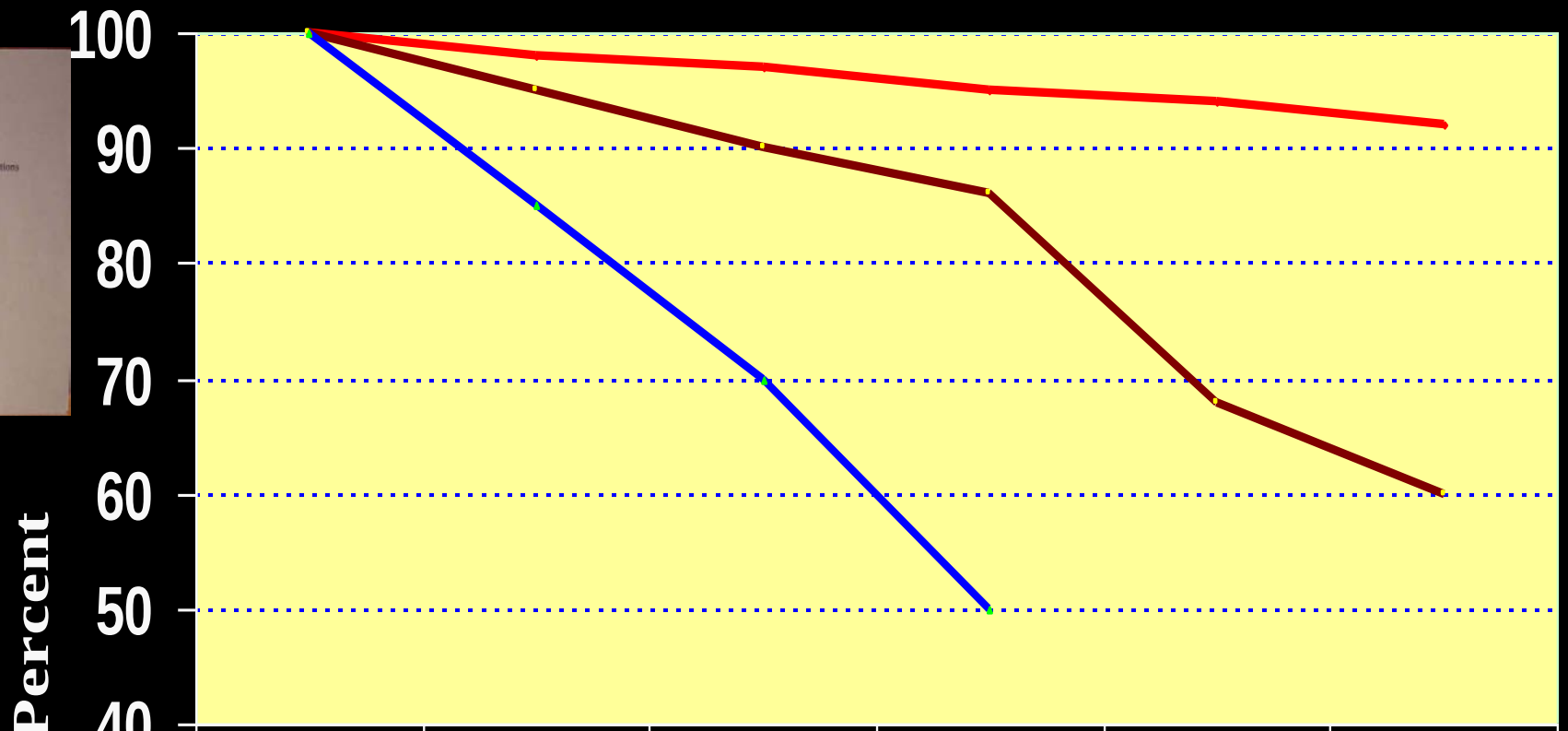
- Clinical Trial
- Randomized Controlled Trial

PMID: 7985509 [PubMed - indexed for MEDLINE]

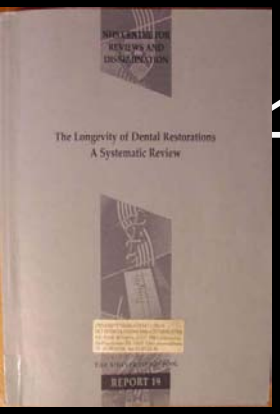
Age of restorations

- Replaced restorations (Retrospective)
- Restorations in situ (Retrospective)
- Restorations in controlled trials (Prospective)



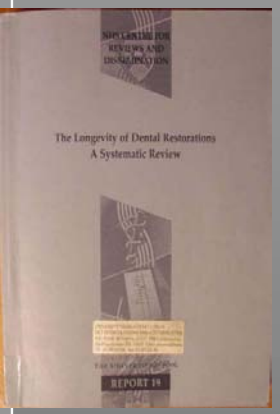


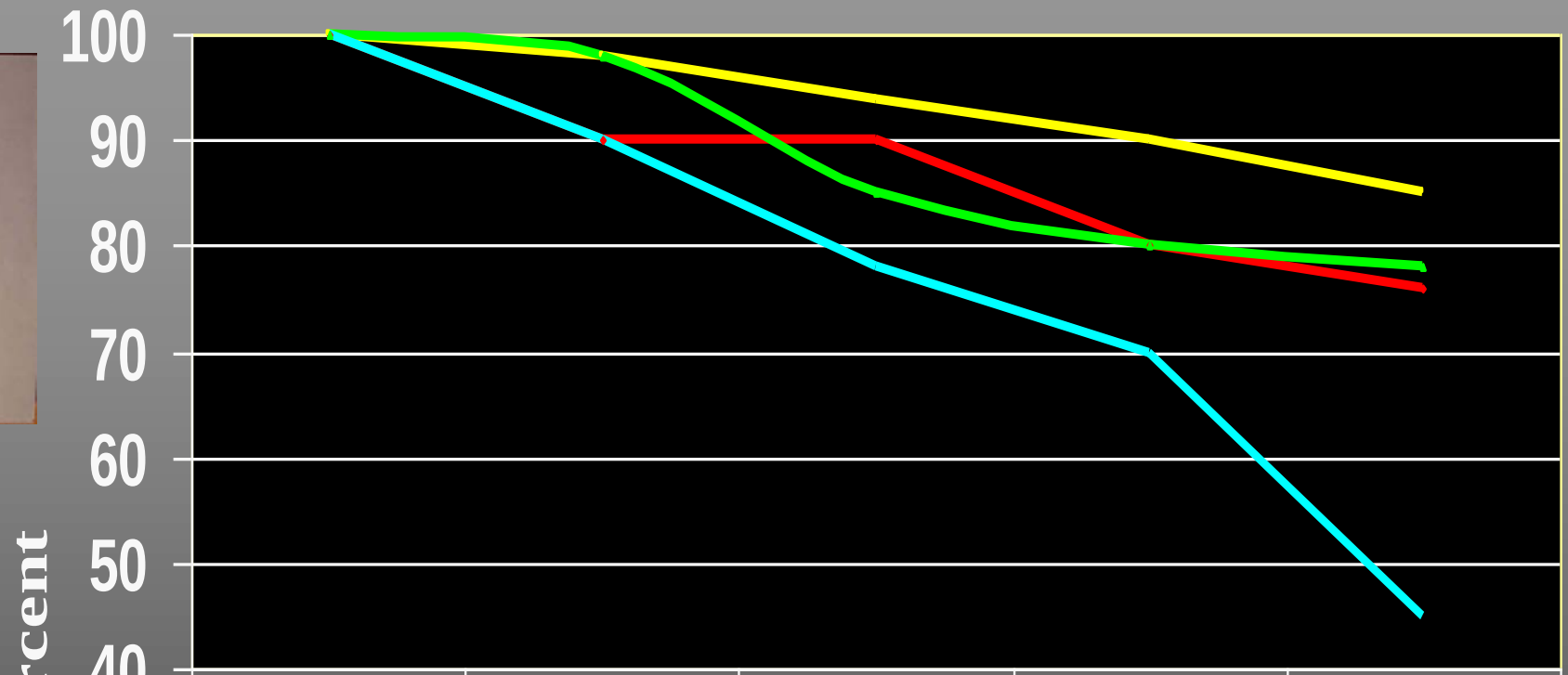
	0	2	4	6	8	10 years
Amalgam	100	98	97	95	94	92
Composite	100	95	90	86	68	60
GIC	100	85	70	50		



Class I and II

years	0	2	4	6	7	8	10 years
Amalgam	100	98	97	95	94	93	92
Composite	100	98	94	87	83	83	77
Inlays	100	95	90	75	68		





	0	1	2	3	4 years
bonding 1A	100	90	90	80	76
bonding 1B	100	98	94	90	85
bonding 2	100	98	85	80	78
bonding 3	100	90	78	70	45

Three plain questions

1. How long do different restorations last ? Material, products, size, intra oral location?
2. Why can’t the researchers provide clear answers to general practitioners?

GPs agenda

A BIG PARADOX

Clinical use of dental restorative materials in the most relevant setting: Who are the real experts?

Materials scientists?

Professors?

General practitioners?

Conscientious, reflective general practitioner

We need...

dental materials scientists practicing clinical dentistry in general practice settings

How many are around?

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Commentary

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I.A. Mjör

INTRODUCTION

The basis of scientific evidence in support of many well-

Thank you for your kind attention