Community Dental Health (2019) **36,** 118-125
Received 18 July 2018; Accepted 3 December 2018

doi:10.1922/CDH_4426Eow08

What evidence do economic evaluations in dental care provide? A scoping review

J. Eow[1], B. Duane[2], A. Solaiman[1], U. Hussain[1], N. Lemasney[1], R. Ang[1], N. O'Kelly-Lynch[1], G. Girgis[1], L. Collazo[1] and B. Johnston[3]

[1]School of Dental Science, Dublin Dental University Hospital, Trinity College Dublin, Dublin 2, Ireland; [2]Department of Child and Public Dental Health, Dublin Dental University Hospital, Trinity College Dublin, Dublin 2, Ireland; [3]Centre for Health Policy and Management, Trinity College Dublin, Dublin, Ireland

***Objective*:** To collate the body of evidence in economic studies of different dental interventions. ***Methods*:** Eligible English studies after 1980 were sourced from MEDLINE using MeSH terms and reviewed independently by 4 teams. Studies were grouped according to the type of dental intervention and their quality appraised using Drummond's Checklist. ***Results*:** The number of dental economic studies increased from 1980 to 2016. A total of 91 studies were identified following the search strategy. Most studies were conducted in the United States (n=23), followed by Germany (n=14), Australia (n=10) and the United Kingdom (n=9). Preventative dental interventions comprised 37% of included studies (n=34), followed by restorative (n=14), prosthodontic (n=13) and periodontal interventions (n=12). Cost effectiveness analyses (n=68) comprise 75% of full economic evaluation (EE) studies, followed by cost-utility (n=17) and cost-benefit (n=6). Quality assessment checklists identified 60 studies as good, 23 as moderate and 8 as poor. Common methodological limitations were identified in EE studies. Comparison of studies identified trends and common findings within each dental intervention. ***Conclusion*:** High quality economic studies are important in directing resources and funding by policy makers. Standardisation of reporting outcome measures will improve the potential for interpretation and comparison between studies. Research adhering to recommended quality assessment checklists will improve the overall quality of evidence to better identify cost-effective treatments for different dental interventions.

Keywords*: Dentistry, oral health, dental economics, economic evaluation, cost-effectiveness analysis, cost-utility analysis, cost-benefit analysis*

Background

The cost of treating and providing dental care represents a considerable portion of the resources allocated to health care budgeting (Wall and Vujicic, 2015). Furthermore, the average yearly EU expenditure on oral disease between 2008 and 2012 was €79 billion. In comparison, the average annual expenditure on respiratory disease and neuromuscular disease were only €55- and €8 billion respectively (Jin *et al*., 2016). As such, resources and funding by government officials play a vital role in relieving the economic burden placed on the population receiving oral healthcare. Economic evaluation serves an integral role for policy makers in comparing the costs and benefits of different interventions within a common framework, guiding the proper designation of limited expenditure. While health economic information is recognised as very important, it is however not used in practice (Williams *et al*., 2008). This is further supported by another study stating that despite the increase in the number of economic evaluation data, little is known about the actual use of such information in decision-making (Ekcard *et al*., 2014).

Economic evaluation (EE) is the process of systematic identification, measurement and valuation of the inputs and outcomes of two alternative activities, and the subsequent comparative analysis of these (Drummond, 2005). In an economic evaluation, two factors, cost and outcome, are taken into consideration. The four frequently applied analyses include cost-benefit analysis, cost-effectiveness analysis, cost-minimisation analysis and cost-utility analysis. Critical appraisal of literary works show that current studies commonly undertake partial economic evaluation where only one of the two factors are considered as highlighted by previous systematic reviews (Tonmukayakul *et al*., 2015). As such, partial EE provides no information on technical and allocative efficiency which may mislead policy makers in believing one treatment is more cost effective than the other. In contrast, a full EE compares both factors in two or more interventions in addition to providing incremental analyses, which aids in identifying cost differences between treatment alternatives. Thus, by comparing the amount of costs incurred and the outcomes derived side-by-side, this paper provides an update from a previous systematic review paper where partial EEs were included (Tonmukayakul *et al*., 2015).

Oral healthcare can only improve with high-quality research to direct decision making and management systems (Cunningham, 2000). Previous reviews in the literature have been solely conducted on specific dental interventions such as fissure sealants and orthodontics (Akinlotan *et al*., 2017; Sollenius *et al*., 2015). While such studies provide valuable information on the specified treatments, they limit the readers' perspectives of alternative treatments and their respective efficiency. Moreover, little has been published to highlight the abundance, or lack of evidence, on dental care interventions that could potentially direct future studies in those fields.

Correspondence to: J Eow, Dublin Dental University Hospital - Dental Science, Dublin Dental University, Hospital Lincoln Place, Dublin 2, Ireland, Dublin Dublin Dublin 2, Ireland. T: 0831816617, E: jia-liang.eow@dental.tcd.ie, eowj@tcd.ie

This study aims to collate the body of evidence available on the economics of oral health care and identify gaps in knowledge found in the literature to better guide future research. In addition, all forms of dental interventions using full EE will be included in this study to better inform the priority setting in dental care for policy makers.

Methods

This scoping review utilised the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement by Moher et al. (2009) as a guide for reporting, as no widely accepted guideline was available for writing scoping reviews.

Eligibility criteria

The present review included studies involving full economic evaluation (CEA, CBA and CUA) of dental interventions published between the years 1980 to 2017 as literature search results before 1980 would be of minimal relevance to current standards and economics of dental treatment. Papers obtained in languages other than English could not be read, as the authors did not have the resources to hire a translator. These papers were eventually excluded. There were no restrictions on country of origin or PICOs (Population, Intervention, Comparison and Outcome) of publications as this review intended to encompass all forms of dental intervention that performed a full EE.

Information sources, search and study selection

The search strategy was performed using MEDLINE and included only human studies from 1980 to 2017. The MeSH terms used in the search for MEDLINE are outlined in the Appendix. References from included systematic reviews were searched for further eligible studies. Any duplicates were removed during the search.

Data collection process, data items

Titles and abstracts of publications from the search were screened according to the eligibility criteria using reference-management software (EndNote version X8). Full texts were obtained for studies considered to be potentially included. All full texts were independently reviewed for inclusion by four pairs of reviewers, with each pair reviewing one quarter of the texts. Crosschecking was carried out by the project supervisor to guarantee consistency that eligible studies were being correctly included or excluded. Any disagreements, either between pairs of reviewers or between reviewers and the project supervisor, were resolved by discussion among the authors and project supervisor. Similarly, papers found through snowballing of eligible systematic reviews were also screened and subsequently reviewed. Overall, agreement among the reviewers and between the reviewers and project supervisor was good.

Quality of the included studies was assessed according to the Drummond's 10-item checklist for papers conducting full EE as recommended by the Cochrane Handbook for Systematic Reviews of Interventions. (Drummond and Jefferson, 1996; Higgins and Green, 2011). The Drummond checklist appraises the quality of a full EE by assessing the study design, data collection and analysis and interpretation of results. Studies were independently assessed for quality among the four pairs of reviewers and crosschecked by the project supervisor. The checklist for each study was summarised in a standardised data extraction form on Microsoft Excel (2016). Characteristics of each study (country of study, aim of study, study population, outcome of interest and type of intervention) were recorded to allow for data synthesis as shown in the Appendix.

Synthesis of results

The quality of full economic evaluations was categorised as poor (0-4 items), moderate (5-7 items) and good (8-10 items) based on the number of items in the studies satisfying the Drummond's checklist. These ranges are arbitrary as no bands were described by Drummond's. The studies were then combined according to their respective country, aim, population, outcome and dental intervention to allow for analysis of data and trends.

Results

Study selection

Application of the search strategy is shown in Figure 1. A total of 6317 studies were identified from MEDLINE. Following title and abstract screening, 6086 studies did not meet the inclusion criteria and were excluded. Full text screening was performed on the remaining 231 papers and reasons for exclusion were noted. Eighty-four studies met the inclusion criteria for qualitative analysis. Of these 84, 11 were systematic reviews. Snowballing from the systematic reviews yielded a further 18 eligible studies. Following the inclusion of snowball searched papers, the systematic reviews were excluded from further analysis. A total of 91 full economic evaluation studies were identified for qualitative analysis.

Study characteristics

Figure 2 summarises the number of studies published over time and their quality ratings. The number of economic studies increased from the year 2000, with the highest frequency between 2010 and 2014 (n= 25). The number of studies found within the most recent 2 years (2015 – 2016*) was notably high (n=19) as compared to previous 5-year spans. Economic studies published in the year 2017 (n= 9) were not analysed as the search was conducted during that year.

More economic studies were conducted in the United States (n= 23), than in Germany (n= 14), Australia (n= 10) or the United Kingdom (n= 9).

As shown in Table 1, of the 91 studies analysed, more than a third (37%) of the studies published were on preventative dental interventions which included interventions such as fissure sealants and fluoride treatment. Unsurprisingly, preventative dental interventions were seen to be the predominant intervention of interest followed by restorative interventions (15%), prosthodontics interventions (14%) and periodontics interventions (13%).

The distribution of economic analyses is shown in Table 1. Full economic analyses performed in dentistry are commonly cost-effectiveness analyses (n= 68). These comprise 75% of full EE studies. Cost-effectiveness analyses were the most common analyses performed in all dental disciplines, except for oral medicine where cost-utility analysis was equally common, where outcome measures such as QALY (quality adjusted life years), QATY (quality adjusted tooth years) and OHRQoL (oral health-related quality of life) were used.

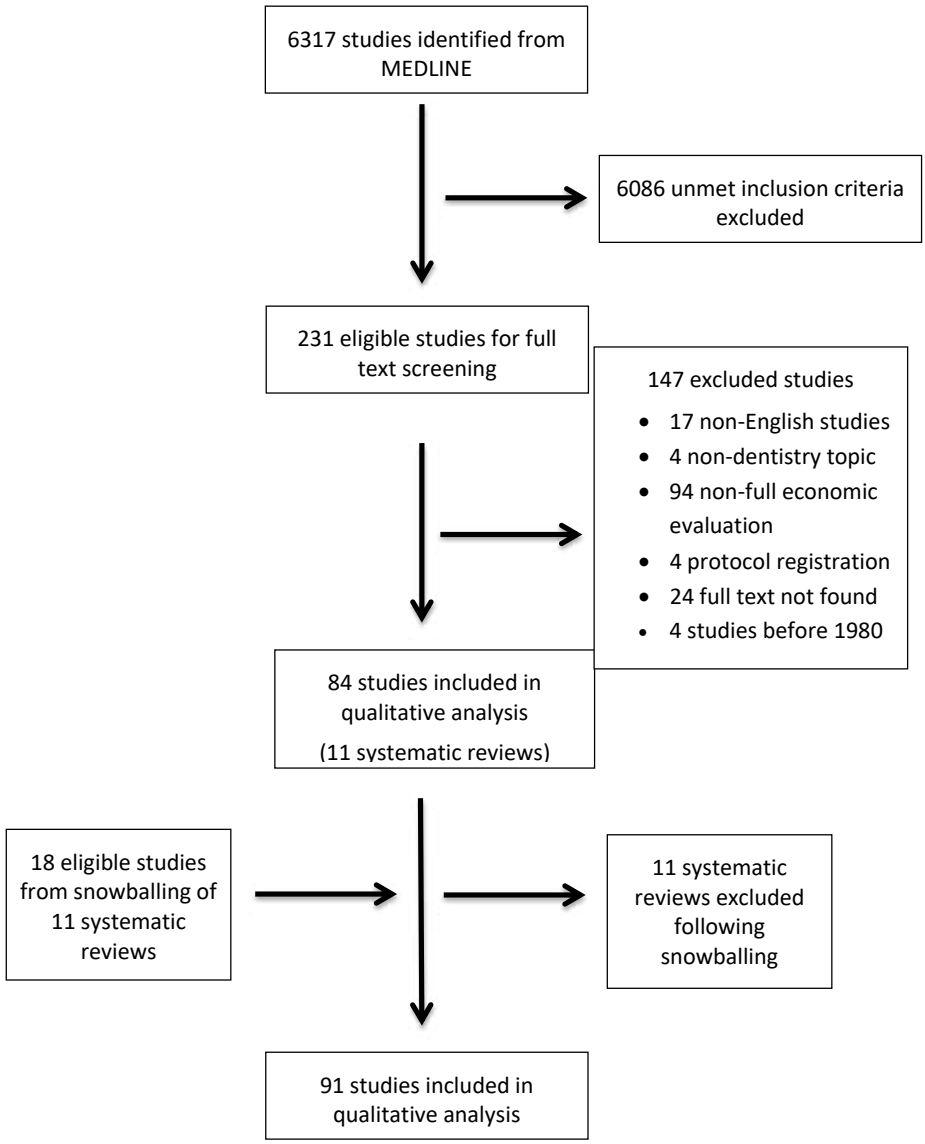

Figure 1: *Flow diagram of search strategy*

Figure 2: *Number of economic studies over time*

Table 1. Type of economic analysis per dental intervention

Dental Intervention (%)	*Cost-effectiveness*	*Cost-utility*	*Cost-benefit*
Preventative (37%)	28	2	4
Restorative (15%)	13	1	0
Prosthodontics (14%)	7	5	1
Periodontics (13%)	7	4	1
Oral Medicine (9%)	4	4	0
Endodontics (5%)	4	1	0
Paedodontics (2%)	2	0	0
Oral Surgery (1%)	1	0	0
Orthodontics (1%)	1	0	0
Special Care (1%)	1	0	0
Total	68	17	6

Qualitative Analysis

Our appraisal of the quality of full economic evaluations using Drummond's checklist categorised 60 of the studies as good, 23 as moderate and 8 as poor.

The distribution of each Drummond's checklist items is shown in Table 2. Of the 91 full economic evaluations, 34% did not satisfy the criterion of adjusting costs and consequences for differential timing, 27% did not value the cost and consequences credibly, while others did not perform incremental (22%) or sensitivity analysis (23%). These were the common shortcomings of articles that were of moderate to poor quality.

Due to the heterogeneity of studies from the disciplines of dental care, no definitive pattern can be noted. Nonetheless, publications on preventative dental interventions generally concluded water fluoridation to be cost effective (Birch, 1990; Ciketic *et al*., 2010; Cobiac and Vos, 2012; Fyfe *et al*., 2015; Marino *et al*., 2007; Wright *et al*., 2001) as did those for targeted fissure sealing of patients at high caries risk (Chestnutt *et al*., 2017; Goldman *et al*., 2016; Leskinen *et al*., 2008; Quinonez *et al*., 2005). Prosthodontic interventions generally found implant-related treatments such as implant overdentures and implant supported crowns to be cost effective and provided the best cost-utility as compared to conventional removable partial dentures and conventional bridges (Chun *et al*., 2016; Zitzmann *et al*., 2013; 2006).

Discussion

Summary of evidence

This scoping review aimed to synthesise the evidence as well as identify gaps in knowledge within the literature to better guide priority setting in dental care. Our findings have shown an increase in the number of published economic studies on dental interventions since the 1980s. This trend highlights the growing awareness and importance of economic studies in analysing the quality of treatment with attention given to the associated costs. Public health decisions should largely be dictated by the evidence provided through research (Orton *et al*., 2011). The increasing body of evidence on dental health economics could guide public health budgets and policies in the efficient allocation of resources. Although full EE constitutes most of the evidence in this review, other health economic analyses such as multi-criteria decision-analysis (MCDA) (Baltussen and Niessen, 2006) should be recognised for their increasing role in the health economics despite being beyond the scope of this study.

Most studies conducting full EE used cost-effectiveness analysis. This is probably due to its's relative ease, which does not require a conversion to a common utility measure such as quality-adjusted life years (QALY) or oral health-related quality of life (OHRQoL). This hinders comparison between different EE studies even where treatment options are similar because the outcome measures may vary. Thus, cost-utility analyses are better suited for comparing between different studies as the QALY and OHRQoL measures are common to all studies.

Furthermore, there was a concentration of evidence on certain interventions, with preventative interventions most common in recent studies, due to the trend towards minimally invasive dentistry. Restorative, prosthodontic and periodontal interventions were of interest to researchers as these are the most common treatments provided by general dental practitioners as compared to other interventions such as oral surgery, orthodontics and special care. This implies that research into certain dental interventions is heavily influenced by the frequency and interest in certain disciplines of dental care, rather than where more research is needed. Hence, further health economic research into areas of dental care where evidence is lacking could benefit future policy implementation and funding in these fields.

Despite the notable growth in studies over time, the proportion of good quality studies has been decreasing, with more moderate to poor quality studies published in recent years. This could be due to the use of publications as a performance indicator for researchers in academic institutions, which may lead to the overproduction of publications to benefit the researchers' careers (Fanelli, 2010). When the primary goal of conducting research is to gain publications, researchers may be pushed to study topics that are more readily published, rather than topics that interest them, resulting in research lacking in robust protocols and methodologies.

Table 2. Drummond's checklist quality appraisal of full economic evaluation studies

Drummond's checklist items	*Yes*	*No*
1. Was a well-defined question posed in answerable form?	90	1
2. Was a comprehensive description of the competing alternatives given?	85	6
3. Was the effectiveness of the programme or services established?	82	9
4. Were all the important and relevant costs and consequences for each alternative identified?	77	14
5. Were costs and consequences measured accurately in appropriate physical units?	82	9
6. Were the cost and consequences valued credibly?	66	25
7. Were costs and consequences adjusted for differential timing?	59	32
8. Was an incremental analysis of costs and consequences of alternatives performed?	71	20
9. Was allowance made for uncertainty in the estimates of costs and consequences?	70	21
10. Did the presentation and discussion of study results include all issues of concern to users?	88	3

The overall quality of EE studies can be improved if future research considers the shortcomings of previous studies, namely the need for discounting of costs, credibility of cost values, sensitivity analyses and incremental analyses. Discounting adjusts the costs and consequences for differential timing and eliminates the effects of inflation. One third of studies (34%) failed to discount, which could over- or underestimate associated costs of treatments. Estimated costs should also be reported from accessible and reliable sources to allow for proper comparison between the costs of treatment options. Credible cost values were lacking in 27% of studies. Sensitivity analysis helps in addressing uncertainty in values as accepting mean values for largely skewed data can be misleading. Nearly a quarter of studies (23%) failed to present evidence of sensitivity analysis. Similarly, 22% of studies did not perform an incremental analysis, which could provide a common unit of measurement to compare different treatment costs and outcomes.

Limitations

This scoping review was unable to include non-English language publications due to limited resources. In addition, other databases (e.g. CINAHL, Scopus, the Cochrane Library, NHS Economic Evaluations Database) were not searched due to time constraints which limits our scope of results sourced from MEDLINE alone. Therefore, by limiting ourselves to only one database we may have omitted some relevant papers. Nevertheless, to the knowledge of the reviewers, MEDLINE was the broadest medical online database available and thus, would have encompassed most relevant studies and be able to demonstrate the feasibility of a more exhaustive review of this topic for future research. Full text screening of papers was divided among four pairs of reviewers. Attempts to ensure consistency were made by crosschecking by the project supervisor, but some bias still may have occurred.

The quality of studies was assessed using the recommended Drummond and Jefferson (1996) checklist. While this approach conveniently appraises the quality of full economic evaluations, it limits the ability to compare between different checklists due to the variation in study designs. Furthermore, categorising the quality of studies based on the number of items in the checklists is arbitrary and may cause misinterpretation of the quality of evidence in certain studies.

Conclusion

The importance of high quality economic studies in directing resources and funding by government officials is well recognised (Skelly and Henrikson, 2013). Although 91 relevant economic studies were found in the literature, the evidence is skewed towards certain dental interventions, with others lacking in this area. Despite more economic studies conducted on dental interventions, lower quality studies have become more common in recent years. Comparisons between interventions was not possible owing to the heterogeneity of outcome measures and reporting between studies. Standardisation of reporting these outcome measures may improve interpretability. Future research adhering to recommended quality assessment tools may improve the quality of studies. It is anticipated that future health economic research will build on the findings of this review to better inform priority setting of dental care.

Acknowledgement

The authors would like to acknowledge Caitriona Honohan, Librarian from the School of Medicine (Trinity College Dublin) in formulating the search terms necessary for this scoping review.

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Appendix

MeSH terms for search strategy in MEDLINE

1. “Economics, Dental”[Mesh]
2. (Econom*[tiab] OR “dental economics”[tiab] OR “health economics”[tiab] OR “medical economics”[tiab] OR “economic evaluation”[tiab] OR “Cost-Benefit Analysis” [tiab] OR “Cost Benefit Analysis” [tiab] OR “Cost Benefit Analyses” [tiab] OR “Cost Effectiveness” [tiab] OR “Cost-Benefit Data” [tiab] OR “Cost Benefit Data” [tiab] OR “Cost-Utility Analysis” [tiab] OR “Cost-Utility Analyses” [tiab] OR “Cost Utility Analysis” [tiab] OR “Cost Utility Analyses” [tiab] OR “Economic Evaluation” [tiab] OR “Economic Evaluations” [tiab] OR “Marginal Analysis” [tiab] OR “Marginal Analyses” [tiab] OR “Cost Benefit” [tiab] OR “Costs and Benefits” [tiab] OR “Benefits and Costs” [tiab] OR “Cost-Effectiveness Analysis” [tiab] OR “Cost Effectiveness Analysis” [tiab] OR “discrete choice experiment” [tiab] OR Choice Model*[tiab] OR “Stated preference methods” [tiab] OR Preference [tiab] OR Patient preference [MeSH] OR Choice behaviour [MeSH])
3. 1 or 2
4. “Dental Health Services”[Mesh]
5. “Oral Health”[Mesh]
6. (“dental care”[tiab] OR dentist*[tiab] OR “dental health care”[tiab] OR “dental health services”[tiab] OR “dental health service”[tiab] OR “dental models”[tiab] OR “dental model”[tiab] OR “dental services”[tiab] OR “dental service”[tiab] OR “dental techniques”[tiab] OR “dental technique”[tiab] OR “dental treatments”[tiab] OR “dental treatment”[tiab] OR “dental intervention”[tiab] OR “dental interventions”[tiab] OR “oral health”[tiab] OR denture[tiab] OR tooth[tiab] OR teeth[tiab])

Characteristics of Studies

Reference, country	*Aim of the study*	*Study population*	*Economic and dental outcomes*	*Type of intervention*
Acevedo *et al*. United States (2016)	To perform a cost-effectiveness analysis of END at the time of primary tumour resection versus WW for patients with early-stage clinically node-negative oral cavity carcinoma.	Patients with T1/T2 clinically node-negative oral cavity squamous cell carcinoma.	Over a lifetime the addition of elective neck dissection to primary surgery reduced overall costs by $6,000 and improved effectiveness by 0.42 QALYs compared with primary surgery alone.	Oral Medicine
Arrow, P. Australia (2000)	To compare the caries preventive effects of a programme comprising selective fissure sealing and application of topical fluorides on first permanent molars (control) with a programme of professional cleaning and oral health education (test).	Hypothetical cohort of 100 children.	An incremental cost-effectiveness ratio of a $40/child/year after two years for the test programme was found.	Preventative
Asgary *et al*. Germany (2012)	To compare cost-effectiveness of VPT/CEM and RCT.	407 patients were randomized to either one-visit RCT or VPT/CEM for 27 months.	RCT had a cost of 171.5K per molar tooth compared with 44.5K for VPT.	Endodontics
Atkins *et al*. United States (2016)	To conduct a cost-effectiveness analysis of five specific dental interventions to help guide resource allocation	Alaska Native children (6-60 months).	The average cost of treating dental caries in the dental chair was $1,467 while the cost of treating FMDRs was $9,349.	Preventative
Balevi *et al*. Canada (2007)	To measure patients' dental-health-state utilities and ranking preferences of the treatment options for these dental problems.	School teachers from Vancouver area.	The expected-utility-value for a 5-year prosthetic survival was highest for the CDB and the STI treatment of an abscessed mandibular molar and maxillary incisor.	Prosthodontics
Bertrand *et al*. Canada (2011)	To simulate a publicly funded program of pit and fissure administration, either in the public or private sectors,and compare these hypothetical situations with the current one.	Virtual population of 8-year-old children.	The current situation and a publicly funded program in the public sector were more cost-effective than the other option: a universal, publicly funded, private practice.	Preventative
Bhuridej *et al*. United States (2007)	To assess the 4-year incremental cost utility of sealing first permanent molars of 6-year-old Iowa Medicaid enrollees from a societal perspective and identified the group of teeth or children in whom sealants are most cost effective.	Medicaid enrollees who turned 6 between 1996 and 1999.	For all first molars, the cost of treatment associated with sealed teeth was higher but the utility was also slightly higher over the 4-year period.	Preventative
Birch, S. Canada (1990)	To analyse the cost-effectiveness of water fluoridation for communities of different sizes and with differing oral health levels.	Communities of different sizes and with differing oral health levels.	The cost per unit health benefit produced from water fluoridation varies by a factor of four according to the existing level of caries prevalence.	Preventative
Chestnutt *et al*. United Kingdom (2017)	To compare the clinical effectiveness and cost-effectiveness of FS and FV in preventing dental caries in first permanent molars (FPMs) in 6- and 7-year-olds and to determine their acceptability.	6- and 7-year-olds.	The proportion of children who developed caries into dentine on a least one FPM was lower in the FV arm than in the FS arm but the difference was not statistically significant.	Preventative

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Chun *et al*. Korea	To conduct an analysis of cost-effectiveness of the implant and conventional fixed dental prosthesis (CFDP) from a single treatment perspective.	Data from Korean Dental Hospital and Statistics Korea.	The CFDP was more cost-effective unless the WTP was more than 75,000 won at the 10th year after prosthodontic treatment.	Prosthodontics
Ciketic *et al*.(2010)	Australia To examine cost-effectiveness of fluoridation of drinking water supplies for Brisbane and South East Queensland.	Fluoridated town of Townsville and non-fluoridated town of Brisbane.	If fluoridation was implemented there would be a total saving of $10,437.43 disability-adjusted life years and AU$ 665,686,529.	Preventative
Cobiac, L.J. and Vos, T. Australia (2012)	To evaluate the cost-effectiveness of this strategy from an Australian health sector perspective.	Australian Population in Tasmania in 1953 and by 2003.	Extending coverage of fluoridation to all communities of at least 1000 people will lead to improved population health, with a dominant cost-effectiveness ratio and 100% probability of cost-savings.	Preventative
Csikar *et al*. United Kingdom (2016)	To compare the cost-effectiveness of smoking cessation services in general dental practice, general medical practice, pharmacy and NHS Stop Smoking Services from the perspective of the provider and the perspective of the NHS.	Retrospective data collected from smoking cessation services across Bradford Metropolitan Borough in the north of England.	For verified quits, only pharmacy services showed a lower mean cost per client and a higher proportion of CO verified quits than the other services.	Preventative
Cunningham *et al*. United Kingdom (2003)	To conduct a cost utility analysis of orthognathic surgery.	21 patients.	The incremental cost for each additional QALY was £561 for the groups combined, based on mean additional costs and QALYs.	Orthodontics
Curtis *et al*. (2011)	Australia To assess the efficacy and cost-effectiveness of a non-invasive approach to dental caries management in private dental practice.	Private dental practices from a variety of locations in New South Wales,	Within the clinical trial there was a significant difference in caries increment favouring non-invasive therapy at both two and three years.	Restorative
Da Mata *et al*. (2014)	Ireland To compare the cost-effectiveness of ART and a conventional technique (CT) for restoring carious lesions as part of a preventive and restorative programme for older adults.	82 patients with carious lesions.	The average cost for ART and conventional restorations was €16.86 and €28.71 respectively; the restoration survival percentages were 91.1% and 97.7%, respectively.	Restorative
Davies *et al*. United Kingdom (2003)	To assess the cost effectiveness of a postal toothpaste programme to prevent caries in 5-year-old children in the north west of England.	Birth cohorts of children ages 12months from high caries risk populations in 9 health districts.	The estimated cost per tooth saved from carious attack was pounds sterling 80.83 and the cost per child of preventing caries experience was pounds sterling 424.38 and avoiding any extractions was pounds sterling 679.01.	Preventative
De Lissovoy *et al*. United States (1999)	To assess the potential economic impact of a new periodontal chemotherapeutic, testing the hypothesis that its adjunctive use would result in reduced periodontal surgical needs.	Patients with periodontal disease.	The base case model projected significantly more maintenance procedures and significantly fewer periodontal surgical procedures for patients treated with SRP and the CHX chip compared with patients who were treated with SRP alone.	Periodontics

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Dedhia *et al*. United States (2011)	To ascertain the cost-effectiveness threshold of a yearly, community outreach screening program for males more than 40 years regularly using tobacco and/or alcohol.	High-risk males, defined as age over 40 years with recent, regular use of tobacco and/or alcohol.	The No-Screen arm was dominated with an incremental cost of $258 and an incremental effectiveness of 0.0414 QALYs.	Oral Surgery
Doessel, D.P. Australia (1985)	To quantify the economic costs and benefits of water flouridation in the city of Townsville, Australia.	Children 6-14 yrs consuming flouridated water in Townsville from 1966 to 2000.	Significant economic benefit will accrue to the Townsville community through water fluoridation, under a wide range of conditions and assumptions.	Preventative
Fardal, Ø. and Grytten, J. Norway (2014)	To identify and quantify: 1. patients' values and treatment expectations; 2. long-term treatment outcomes as they relate to patients expectations; 3. human and financial costs with cost utilities; 4. the magnitude and spread of outcome variability using both objective and patientbased parameters.	80 patients with an average age of 64.3 years and with 21.6 maintenance years.	The cost of buying an extra tooth year was €20.2.	Periodontics
Frenkel *et al*. United Kingdom (2001)	To assess whether oral health care education for nursing home caregivers would achieve improvements in clients' oral health.	Institutionalised elderly people.	Reductions in denture plaque scores exceeded those of the control group by 1.15 at 1 month and by 1.47 at 6 months.	Preventative
Fyfe *et al*. New Zealand (2015)	To use recent data to determine whether Community Water Fluoridation (CWF) remains a cost e-ective public health intervention in New Zealand, given a reduction in dental caries in all communities over time.	Communities with populations of less than 5,000, 5,000 to 10,000, 10,001 to 50,000 and greater than 50,000.	CWF was cost e-ective in all communities at base case. CWF remained cost e-ective for communities over 5,000 under all scenarios when sensitivity analysis was conducted.	Preventative
Goldman *et al*. China (2016)	To compare the incremental cost-effectiveness of oral health interventions, in particular their delivery to underserved populations.	School-age children in Wuhan, China.	Preventing one more cavitated dentine carious lesion cost US$105 for the study data when comparing HVGIC with composite resin and US$59 per 1,000 sealants in the projections; LED thermocured HVGIC compared with composite resin cost US$115 for one more cavitated lesion and US$52 per 1,000 sealants, respectively.	Preventative
Goldman *et al*. China (2014)	To (i) calculate the cost per sealant in the four study groups 2 yr after placement; and (ii) to determine the average and incremental cost-effectiveness of the sealants given their rates of survival 2, 4, and 6 yr after placement.	Schoolchildren, average age 8 years old in Wuhan, China.	The incremental cost-effectiveness of LED thermocured HVGIC to prevent one additional caries lesion per 1,000 sealants performed was $US1,106 compared with composite resin.	Preventative
Griffin *et al*. United States (2001)	To assess the local cost savings resulting from community water fluoridation, given current exposure levels to other fluoride sources.	Nonfluoridated communities.	With base- case assumptions, the annual per person cost savings resulting from fluoridation ranged from $15.95 in very small communities to $18.62 in large communities.	Preventative
Griffin *et al*. United States (2002)	To analyse the cost-effectiveness of 3 sealant delivery strategies: Seal all (SA), seal children assessed to be at risk by screening (TARGET), and seal none (SN).	Schoolchildren, aged 10 to 13 yrs.	Under baseline assumptions, TARGET dominated (cost less and reduced caries) SA and SN.	Preventative

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Hannerz, H. and Westerberg, I. Sweden (1996)	To assess the economic efficiency of an alternative division of labour based on an extensive use of ental hygienists cobined with a reduced input of dentists.	80 adolescents, born in 1975, in their 13th to 18th years.	The results showed statistically significant, lower caries incidence in the test group.	Paedodontics
Henke *et al*. United States (2001)	To present an economic analysis of the CHX chip in general dental practice.	484 chronic periodontitis patients.	Total dental charges were higher for SRP + CHX chip patients vs. SRP patients when CHX chip costs were included but lower when CHX chip costs were excluded.	Periodontics
Hens *et al*. Spain (2012)	To study the cost effectiveness of four alternative treatments for burning mouth syndrome (BMS)	Patients with diagnosis of idiopathic BMS.	Topical clonazepam proved to be the drug of choice for BMS, also proved to be the most cost effective.	Oral Medicine
Heydecke *et al*. Canada (2005)	To copare the cost and effectiveness of mandibular conventional dentures and two-implant overdentures in elderly subjects.	Patients 65-75 years edentulous for at least 5 years.	Using an average life expectancy of 17.9 years, the equalized annual costs were $399 for CD and $625 for IOD, and the equalized annual values for the outcome were 47.0 for CD and 31.3 for IOD treatment.	Prosthodontics
Hietasalo *et al*. Finland (2009)	To assess the cost effetiveness of an experimental caries control regimen in a randomized control trial conducted in Finland in 2001-2005.	Children who were 11–12 yr of age and had at least one active initial caries lesion at baseline.	The incremental cost-effectiveness ratio was €34.07 per averted DMF surface.	Restorative
Higashi *et al*. United States (2002)	To determine the clinical scenario required to produce cost-effective results with the use of IL-1 testing to identify high-risk patients.	Caucasian male and female patients (age 35) who were referred to a periodontist with an initial diagnosis of mild periodontitis.	Using different modeling scenarios, the genetic test produced results ranging from cost savings of $830,140 and 52.8 fewer cases of severe periodontitis to increased costs of $300,430 and 3.6 additional cases of severe periodontitis.	Periodontics
Jacobson *et al*. United States (1991)	To determine the most cost-effective strategy to prevent late prosthetic joint infections.	70 patients hospitalized between July 1 1982 and June 30 1986	The most cost-effective preventive strategy was the no prophylaxis alternative.	Oral Medicine
Jensen *et al*. Netherlands (2017)	To conduct a cost-effectiveness analysis comparing conventional removable partial dentures and implant-supported RPDs treatment in patients with an edentulous maxilla and a bilateral free-ending situation in the mandible.	Fifteen men and fifteen women with a mean age of 61.0 ± 6.6 years.	The mean total opportunity costs were €981 for the RPD treatment and €2.480 for the ISRPD treatment.	Prosthodontics
Jokela, J. and Pienihäkkinen, K. Finland (2003)	To assess the economic aspects of a risk based caries prevention programme in preschool children.	2-year-old children born in 1987 or 1988	In preschool children, a risk-based prevention program can be effective in reducing both dental caries and running costs, provided that preventive dental assisatants carry out the program.	Preventative
Jönsson *et al*., Sweden (2012)	To compare costs and consequences if an individually tailored oral health education programme based on cognitive behaviour strategies in non surgical periodontal therapy compared with a standard treatment programme.	Patients with moderate-to-advanced periodontitis	More individuals in the ITOHEP group reached the pre-set criteria for treatment success than individuals in the ST group did.	Periodontics

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Kanzow *et al*. Germany (2016)	To compare the cost-effectiveness of repairing versus replacing composite or amalgam restorations.	1000 60-year old females with one permanent molar with a vital non-painful pulp and a three-surfaced composite or amalgam restoration in need of repair or replacement.	Compared with complete composite replacement, composite repairs were marginally more costly and more effective.	Restorative
Kelly, P.G. and Smales, R.J. Australia (2004)	To determine the relative cost-effectiveness of alternative methods for restoring large tooth substance loss in adults.	100 patients from three selected private dental practices.	The direct placement restorations were more cost-effective than the indirect restorations at all time intervals over the 15-year study period.	Restorative
Khouja, T. and K. J. Smith. United States (2017)	To compare the cost-effectiveness of these two strategies in preventing dental caries lesions on the occlusal surface of the first permanent molar in children.	Hypothetical cohort of children.	Over the 9-year study period PFS were less expensive and more effective than FV in preventing occlusal dental caries lesions.	Preventative
Kim *et al*. South Korea (2014)	To assess the cost-effectiveness from a societal perspective of a dental implant compared with a three-unit tooth-supported fixed partial denture for the replacement of a single tooth in 2010.	Patients who had lost a single tooth, who could receive either a dental implant or a three-unit FPD and could choose between these treatment options.	The results of a 10-year period model showed that a single dental implant cost US $261 (clinic) to $342 (hospital) more than an FPD and had an average survival rate that was 10.4% higher.	Prosthodontics
Klock, B. Sweden (1980)	To assess the benefit of prevention of dental disease by cost-benefit and cost effectivneness analysis.	9 - 12-year-old children.	In spite of a marked reduction in caries activity, both CBA and CEA indicated that the preventive program was highly uneconomic compared to traditional dental care.	Preventative
Koh *et al*. Australia (2015)	To evaluate the cost-effectiveness of a home-visit intervention conducted by oral health therapists relative to a telephone-based alternative and no intervention.	Children from age 6 months to 6 years.	For every group of 100 children, the model predicted that having the home-visit intervention would save $167 032 and telephone contacts $144 709 over 5½ years relative to no intervention (usual care).	Preventative
Kolker *et al*. United States (2006)	To determine the differences in costs and effectiveness of large amalgams and crowns over 5 and 10 years when catastrophic subsequent treatment (root canal therapy or extraction) was the outcome.	Patients seen at University of Iowa between 1987 or 1988.	Teeth with crowns had higher effectiveness values at a much higher cost than teeth restored with large amalgams.	Restorative
Kolstad *et al*. United States (2015)	To perform a cost-benefit analysis of the age one dental visit for privately insured patients.	Children 1-5 years.	The annual cost for children who had their first dental visit by age one was significantly less than for children who waited until an older age.	Preventative
Kowash *et al*. United Kingdom (2006)	To evaluate the benefit-cost and cost-effectiveness of a long-term dental health education program to prevent early childhood caries through home visits.	7,000 children in school grades kindergarten to 12 years attending public/state schools.	The cavities, as early childhood caries saved over the three year period indicated a benefit-cost ratio for the dental health education program of 5.21 compared with slow releasing fluoride device of 4.17; community water fluoridation of 1.15 and fissue sealant programs of 0.42.	Preventative

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Leskinen *et al*. Finland (2008)	To retrospectively analyze the cost-effectiveness of sealant treatment in two health centers with different caries preventive strategies in Finland using a practice-based research protocol.	Children born in 1988-1990 in Kemii and in 1990 in Vantaa.	Sealing of risk children in Kemi resulted in a total cost of 185€ per child whereas the respective cost of routinely sealed children in Vantaa was 235€.	Preventative
Levey, C. and Dunbar, C. Ireland (2015)	To examine the cost-effectiveness of rehabilitation using removable dental prosthesis (RDP) versus a 'functionally orientated' treatment based on the shorteneddental arch concept (SDA) using resin retained bridgework.	One hundred and thirty-two patients were randomised; 65 to the RPD group and 67 to the SDA group.	The cost-effectiveness ratio was therefore 1:1.84 in favour of SDA treatment.	Prosthodontics
Listl *et al*. Germany (2014)	To assess the value for money achieved by bar-retained implant overdentures based on six implants compared with four implants as treatment alternatives for the edentulous maxilla.	Adult patients with an edentulous maxilla.	The cost-effectiveness threshold was identified to be 17,564€ per year of denture satisfaction gained above of which the alternative with six implants is preferable over treatment including four implants.	Prosthodontics
Lundqvist *et al*. Sweden (2015)	To analyse health economic consequences of domiciliary dental care for elderly nursing home residents in Sweden, compared to dentistry at a fixed clinic.	Elderly nursing home residents in Sweden.	The mean societal cost of domiciliary dental care for elderly nursing home residents was lower than dental care at a fixed clinic, and it was also considered cost-effective.	Preventative
Mac Giolla Phadraig *et al*. Ireland (2015)	To address the gap in the literature by reporting a CEA of an oral health program, undertaken alongside a cluster randomized controlled trial.	Care-staff, who cared for people with ID in community based residential units in Dublin, Ireland.	It cost between €7000 and €10,000 more to achieve modest improvement in K&BAS scores among a subsample of 162 care-staff, in comparison to doing nothing.	Special Care
Marino *et al*. Chile (2007)	To assess the cost-effectiveness of a community dental caries prevention programme, targeting pre-school children living in non-fiuoridated rural areas of Chile.	Pre-school children living in non-fluoridated rurual areas of Chile	Children who received fluoridated products had significantly lower mean levels of dental caries than those who had not.	Preventative
Maryniuk *et al*. United States (1988)	To develop a model of the lifetime restorative needs of a posterior tooth, and to evaluate the cost effectiveness of various restorative strategies in the restoration of a posterior tooth with either a large (4-surface) pin amalgam or a crown.	Computer model simulated of a 30 yr old adults tooth with a life expetency of 72yr.	According to the analyses, the optimum treatment decision is to attempt to replace the failed amalgam with another amalgam, instead of a crown.	Restorative
McKenna *et al*. Ireland (2013)	To compare the cost-effectiveness of conventional treatment using partial dentures with functionally orientated treatment to replace missing teeth for partially dentate elders using a randomised controlled clinical trial.	Fourty-four partially dentate patients aged 65 years and older	Both groups reported improvements in OHRQoL 1 month after completion of treatment.	Prosthodontics
McKenna *et al*. Ireland (2014)	To conduct a cost-effectiveness analysis comparing two different tooth replacement strategies for partially dentate older patients, namely partial removable dental prostheses (RDP) and functionally orientated treatment based on the shortened dental arch concept (SDA).	Partially dentate patients aged 65 years and older.	The total cost of achieving the minimally important clinical difference in OHrQOL for an average patient in the RDP group was €464.64.	Prosthodontics

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Miyayasu *et al*. (2017)	Japan	To compare the cost and to evaluate cost-effectiveness of fabricating mandibular complete dentures using two different impression methods.	27 edentulous patients.	The total cost was 43904 Japanese Yen (JPY) for the conventional method and 39792 JPY for the simplified method, and this difference was statistically significant. / 395.78 USD) for the conventional method and 39,792 JPY (299.93 EUR / 358.70 USD) for the simplified method, and this difference was statistically significant ($p <$ 0.001). The ICER showed a cost of 633 JPY (4.77 EUR / 5.70 USD) for every one point change in general patient satisfaction	Prosthodontics
Morgan *et al*. (1997)	Australia	To present an evaluation of the acceptability, in an Australian setting, of a three-year, school-based, primary preventive programme consisting of a fluoride mouthrinse (FMR) and pit and fissure sealant placement (FS).	Students 12-13 years from five secondary colleges in two non-fluoridated areas in Victoria.	In general, the programme was consideredto representan acceptable model for future preventive interventions, although there were areas of its design that were found to require improvement.	Restorative
Neidell *et al*. (2016)	United States	To assess the cost-effectiveness of dental sealants and fluoride varnish.	6-8 year old school children.	In our base case scenario, varnish is more cost-effective in preventing caries.	Preventative
O'Neill *et al*. (2017)	Northern Ireland	To measure the effects and costs of a combined fluoride intervention designed to prevent caries in young children attending dental services.	Children were eligible for inclusion if they were 2 or 3 but not yet 4 y old andat caries (into dentine) free at baseline.	The mean cost per carious surface avoided was estimated at £251.	Preventative
Pennington *et al*. (2009)	United Kingdom	To evaluate the cost-effectiveness of root canal treatment for a maxillary incisor tooth with a pulp infection, in comparison with extraction and replacement with a bridge, denture or implant supported restoration.	Markov model of a damaged, irreversibly pulpitic maxillary central incisor in an otherwise healthy adult male of varying age.	Root canal treatment extended the life of the tooth at an additional cost of £5–8 per year of tooth life.	Endodontics
Quinonez *et al*. (2005)	United States	To compare three strategies for managing the occlusal surfaces of first permanent molars: seal all (SA), risk-based (RBS), and seal none (SN).	Not stated	RBS strategy improved clinical outcomes, in the form of cavity-free months, and saved money over SN.	Restorative
Quinonez *et al*. (2006)	United States	To examine the cost-effectiveness of fluoride varnish application by medical providers when implemented within a well-child periodicity schedule for Medicaid-enrolled children.	Children aged 9 - 42 months.	Fluoride varnish improved clinical outcomes by 1.52 cavity-free months but at a cost of $7.18 for each cavity-free month gained per child and $203 for each treatment averted.	Preventative
Sakuma *et al*. (2010)	Japan	To estimate the cost-effectiveness and cost-benefit ratio for a school-based combined program with fluoride mouth rinse and targeted fissure sealant in children residing in non-fluoridated areas in Japan.	8-year-old and 11-year-old children in Japan.	The mean reduced DFT differences between groups were 1.44 in 8-year-old and 3.17 in 11-year-old children.	Preventative

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Schwendicke *et al*, Germany (2014)	To assess the cost-effectiveness of retaining furcation involved molars via periodontal treatments versus replacing them via implant-supported crowns.	Markov model of 50-year-old male patient with an average remaining life expectancy of 29.7 years.	Despite requiring re-treatment later than other strategies, ISCs were the most costly therapy.	Periodontics
Schwendicke *et al*, Germany (2014)	To analyse the cost-effectiveness of the described three excavation strategies in individuals with different risks, and explored the long-term impact of caries removal on the distribution of health.	Markov model of 18-year old male individual, either with low or high risk, over his lifetime.	Selective excavation was more effective and less costly than both alternatives regardless of an individual's risk.	Restorative
Schwendicke *et al*, Germany (2015)	To assess the cost-effectiveness of 3 detection methods for occlusal caries in combination with different treatments initiated at different cutoffs in populations differing in their caries prevalence.	Markov model of 12-y-old male German patient over his lifetime.	The suitability of detection methods differed significantly between populations, and the cost-effectiveness was greatly influenced by the treatment initiated after lesion detection.	Restorative
Schwendicke *et al*. Germany (2013)	To analyse the cost-effectiveness of one- and two-step incomplete as well as complete excavations.	Markov model of 15-year-old patient.	One-step incomplete excavation resulted in lower long-term costs and in longer-retained teeth and their vitality compared with two-step incomplete and complete excavations, and dominated the other strategies in 70% to 100% of simulations.	Restorative
Schwendicke *et al*. Germany (2015)	To assess the cost-effectiveness of mineral trioxide aggregate versus calcium hydroxied for direct pulp capping using a model-based simulation approach.	Markov model of 20-year-old patient.	Direct pulp capping using mineral trioxide aggregate was both more effective and less costly than calcium hydroxied.	Endodontics
Schwendicke *et al*. Germany (2016)	To assess the cost-effectiveness of regular versus irregular SPT, and to compare both strategies with immediate tooth-removal.	Markov model of 47-years-old male patient with an average remaining life-expectancy of 32.5 years.	Regular SPT was more effective, but more costly with an incremental cost-effectiveness ratio of 29 Euro/year.	Periodontics
Schwendicke *et al*. Germany (2016)	To assess the cost-effectiveness of different detection methods for proximal secondary lesions using Monte Carlo microsimulations.	Modeled population of initially 20-y-old individuals.	In the majority of simulations, not combining detection methods or applying them at sensitive thresholds was less effective and more costly.	Preventative
Schwendicke *et al*. Germany (2017)	To analyse the costs of removing all, none or only those molars predicted to be at-risk for extraction during supportive periodontal therapy.	Model-based study using a German private-payer-perspective.	Removing only molars with furcation involvement III and removing no molars were significantly less costly than removing all molars.	Periodontics
Schwendicke, F. and Göstemeyer, G. Germany (2016)	To assess the long-term cost-effectiveness of single- versus multivisit root canal treatment using a model-based approach.	Simulated model over the lifetime of 40-year-old patients.	For nonvital molars without periapical lesions, single-visit treatment was minimally less costly and more effective than multiple-visit treatment.	Endodontics

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Schwendicke, F. and Stolpe, M. Germany (2017)	To assess the cost-effectiveness of different post-retained crowns.	Markov model of an initially 50-year-old patient during his lifetime. 1000 independent individual molars being followed during the average expected lifetime of patients (which was 29 years	Preformed metal post retained restorations were least costly, retaining teeth for 26.7 years.	Prosthodontics
Schwendicke. F and Stolpe. M. Germany (2014)	To assess the cost-effectiveness of both direct capping and RCT for pulps being exposed during caries removal.	Markov model of a 20-year-old male patient over his lifetime.	Despite requiring follow-up treatments significantly earlier, teeth treated by direct pulp capping were retained for long periods of time at significantly reduced lifetime costs compared with teeth treated by RCT.	Endodontics
Skaar *et al*. United States (2015)	To identify the ranges of assumptions that may favor one prophylaxis strategy over another.	Markov model of a 65 year old who had undergone total hip arthoplasty.	A strategy of foregoing antibiotic prophylaxis before dental visits was cost-effective and resulted in lower lifetime accumulated costs and higher accumulated quality-adjusted life years when compared with alternative prophylaxis strategies.	Oral medicine
Stearns *et al*. United States (2012)	To estimate the cost-effectiveness of a medical office–based preventive oral health program in North Carolina called Into the Mouths of Babes.	Medicaid enrollees younger than 3 years.	Into the Mouths of Babes is 32% likely to be cost-saving, with discounting of benefits and payments.	Preventative
Stone *et al*. United Kingdom (2013)	To undertake cost-effectiveness and cost benefit analyses of an intervention to improve oral health in patients presenting with the gingival manifestations of oral lichen planus (OLP).	82 patients .	Overall, 81% of intervention patients showed improvement in both plaque index and mucosal disease score at 20 weeks compared to 30% of controls that continued with their usual plaque control regimen.	Oral Medicine
Tobi *et al*. Netherlands (1999)	To yield information on the relative cost-effectiveness of the use of composite resins and amalgam for the re-restoration of amalgam Class II restorations.	Patients between 15 and 35 years of age and in good general health.	Replacing an amalgam Class II restoration with amalgam is associated with lower costs than replacing with a composite resin.	Restorative
Tonmukayakul, U. and Arrow, P. Australia (2016)	To assess cost-effectiveness of the atraumatic restorative treatment-based approach against the standard care approach to managing early childhood caries in a primary care setting based on a 1-year pragmatic randomized controlled trial.	Participating children.	$654 was saved per referral to specialist avoided and $36 was saved per additional dental treatment.	Paedodontics
Tsevat *et al*. United States (1989)	To evaluate whether patients with artificial joints should take penicillin, erythromycin, or no antibiotics before dental procedures.	Not stated.	The cost-effectiveness of antibiotic prophylaxis with erythromycin compares favorably with other medical interventions.	Oral Medicine

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Van der Linden *et al.* Netherlands (2016)	To calculate the cost–utility of different strategies for the detection of occult lymph node metastases in cT1–T2N0 oral cancer.	Sixty-two patients with T1–T2 oral cancer and cN0 neck based on palpation and ultrasound guided fine needle aspiration cytology.	With a 5- or 10-year time horizon, sentinel lymph node biopsy results in the highest number of additional quality-adjusted life years for the smallest additional costs compared to ultrasound guided fine needle aspiration cytology.	Oral Medicine
Van der Meij *et al.* Netherlands (2002)	(i) To calculate costs and effectiveness of screening for oral cancer in OLP patients with a decision model; (ii) to compare the cost-effectiveness of different screening scenarios; and (iii) to perform a sensitivity analysis of several variables used in this model.	Hypothetical population of 10 000 000 people, which is the population of the Netherlands, over the age of 15 years.	The health gain from screening was 592 QALY's or the equivalent of 23.68 lives saved, costing $1 265 229, meaning that one ELS costed $53 430.	Oral Medicine
Vermaire, J.H *et al.* Netherlands (2013)	To assess the cost-effectiveness of caries treatment and prevention strategies in the Netherlands.	Patients aged 6.0 years (± 3 months).	The ICERs compared with regular dental care from a health care system perspective and societal perspective were, respectively, EUR 269 and EUR 1,369 per prevented DMFS in the increased professional fluoride application programme, and EUR 30 and EUR 100 in the non-operative caries treatment and prevention programme.	Restorative
Virtanen *et al.* Sweden (2017)	To compare the cost-effectiveness estimates of a brief counselling of smoking cessation in dentistry by using two different health economic models.	Swedish smokers aged 20-75 years.	The cost per quitter was US$552 in the intervention and US$522 in the 'usual care' condition.	Periodontics
Warren *et al.* Australia (2016)	To re-evaluate the per-protocol cost-effectiveness of the CMS approach.	An individual patient-simulation Markov model.	The per-protocol lifetime cost per restorative event avoided is AUD1,980.	Restorative
Weintraub *et al.* United States (1993)	To study the cost-effectiveness of dental sealants placed under routine, unrestricted practice condition in a fluoridated community.	275 patients at a children's dental clinic for low-income families	The incremental cost-effectiveness For children with four first molars sealed versus children without sealants steadily became more favorable with time so that, after 11 years, the incremental CE ratio was $4.06 per additional welltooth year.	Preventative
Werner *et al.* United States (2000)	To evaluate the performance of the school-based program during 1991 by comparing the costs of the school-based program with the costs of the sealants placed in the clinic in twelve months.	Not stated.	The cost of saving one tooth-surface from decaying within a six-year period at the school and the clinic was $65 and $42 with an average sealing time per tooth surface of 18 and 12.5 minutes, respectively.	Preventative
Wright *et al.* New Zealand (2001)	To investigate whether it is cost-effective to fluoridate water supplies that are now non-fluoridated.	A range of population sizes was considered.	Fluoridation was cost-saving for communities above about a thousand people.	Preventative
Zabos *et al.* United States (2002)	To present a cost-effectiveness analysis of a successful school-based dental sealant program for low-SES children.	Low socioeconomic status children.	Administering sealants to low-SES children saves money relative to ordinary dental care.	Preventative

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Zitzmann *et al*. Switzerland (2013)	To draw on previous research to compare the long-term cost-effectiveness of implant treatment to restore a single missing tooth with that of the conventional 3-unit FDP.	15 patients with implant supported crowns and 11 with fixed dental prostheses.	Iimplant supported crowns was the dominant strategy, with a quality adjusted tooth years increase of 0.01 over 3 years and 0.04 over 10 years with a higher probability of being cost-effective.	Prosthodontics
Zitzmann *et al*. Switzerland (2006)	To assess whether implant treatment in the mandible represents value for money spent.	Sixty edentulous patients who visited the Clinic for Reconstructive Dentistry during January 1999, and December 2001 who required treatment in the edentulous lower jaw with removable prostheses.	The cost per Quality-adjusted Prosthesis Year gained for implant treatment was CHF 9100 (2 implants) and CHF 19,800 (4 implants) over 3 years.	Prosthodontics