

Original Contributions

Systematic Review

Does providing dental services reduce overall health care costs?

A systematic review of the literature

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Supplemental material
is available online.

ABSTRACT

Background. The authors conducted a systematic review of the literature to assess the impact of dental treatment on overall health care costs for patients with chronic health conditions and patients who were pregnant.

Types of Studies Reviewed. The authors searched multiple databases including MEDLINE, Embase, Web of Science, and Dentistry & Oral Sciences Source from the earliest date available through May 2017. Two reviewers conducted the initial screening of all retrieved titles and abstracts, read the full text of the eligible studies, and conducted data extraction and quality assessment of included studies.

Results. The authors found only 3 published studies that examined the effect of periodontal treatment on health care costs using medical and dental claims data from different insurance databases. Findings from the qualitative synthesis of those studies were inconclusive as 1 of the 3 studies showed a cost increase, whereas 2 studies showed a decrease.

Conclusions and Practical Implications. The small number of studies and their mixed outcomes demonstrate the need for high-quality studies to evaluate the effect of periodontal intervention on overall health care costs.

Key Words. Delivery of health care; dental economics; systems integration.

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The US oral health care system has remained fundamentally separate from the medical care system since its inception. Largely a result of historical trends in the insurance, educational, and professional systems within medicine and dentistry, this separation has had dramatic impacts on oral health care financing and access to oral health care services, especially for vulnerable populations.^{1,2}

The publication of the US surgeon general's landmark report *Oral Health in America* in 2000 provided a platform to connect the mouth with the rest of the body. The report provided evidence inextricably linking oral health with other health outcomes.³ Subsequent studies have found that poor oral health has been associated with numerous systemic conditions, including diabetes, cardiovascular disease, pneumonia, depression, and malnutrition.⁴⁻⁸ Particular interest has been given to the association between periodontal disease, diabetes, and cardiovascular disease from the rise in systemic inflammatory markers noted in these conditions.⁹

An estimated 40% of American adults have periodontal disease, and rates of co-morbidity with diabetes and cardiovascular disease are high.¹⁰ Treatment of periodontal disease has been noted to reduce blood levels of these markers, such as C-reactive protein.^{11,12} If effective, it is conceivable that a low-cost, low-risk intervention such as periodontal treatment may have the potential to significantly reduce costs for insurers, patients, and health care systems.

However, studies that assessed the impact of dental treatment on downstream health outcomes have been at best equivocal. Although Merchant and colleagues¹³ found an improvement in hemoglobin A_{1c} among veterans with type 2 diabetes (T2D) and periodontal disease after periodontal treatment, Engebretson and colleagues¹⁴ randomized controlled trial was stopped early because of a

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lack of effect from the same treatment. A Cochrane review found insufficient evidence of improved diabetic control among patients who had received periodontal treatment.¹⁵

Whereas traditional Medicare provides no dental coverage and Medicaid coverage for adult oral health care varies at the state level, numerous private insurers have begun to pilot programs that offer combined medical and oral health care or incentivize oral health care for patients identified as high risk of developing oral or systemic disease.¹⁶⁻¹⁸ Given the potential for barriers such as cost,^{19,20} provider availability, and geographic location²¹ that may prevent certain populations from obtaining oral health care even when coverage is provided, it remains unclear whether such systems will actually result in savings for payers and patients.

The purpose of this study was to conduct a systematic review to assess the impact of dental treatment on overall health care expenditure for patients with chronic health conditions and patients who are pregnant.

METHODS

Search strategy

We retrieved studies examining the costs or expenditures associated with periodontal care or therapies in pregnancy or in patients with chronic conditions (diabetes mellitus, cerebrovascular disease, coronary artery disease, and rheumatoid arthritis) from MEDLINE (including In-Process and NonIndexed Citations; Ovid Technologies), Embase, Web of Science, and Dentistry & Oral Sciences Source. We searched each database from the earliest date available through May 2017. Our search strategy included controlled vocabulary terms, when available, and synonyms without language limit. The complete search strategies are available in the online appendix ([eTable](#), available online at the end of this article).

Study selection

Two reviewers (L.S., H.E.) conducted the initial screening of all retrieved titles and abstracts according to the following inclusion criteria:

- original empirical studies;
- examined the effect of periodontal treatment on health care costs;
- patients had either chronic inflammatory medical conditions or patients were pregnant.

The same 2 reviewers read the full text of the eligible studies. A third reviewer (S.T.) was consulted if inconsistency between the 2 reviewers occurred; disagreement was resolved by discussion among reviewers.

Data extraction and quality assessment

Data extraction and quality assessment of included studies were completed by 2 reviewers (S.T., H.E.); the third reviewer (L.S.) was consulted when disagreement occurred. A piloted data extraction form was used for data collection. Data extracted included information on publication details (publication year, authors, country of investigation), study methods (study design, data source, study population, inclusion criteria), and outcomes (sample size, response rate, health care costs and any other outcomes reported, overall conclusion). We used the Newcastle-Ottawa Scale for cohort studies to assess the methodological quality of included studies.²² This assessment tool uses a star system, ranging from 0 to 9, and evaluates each study based on 3 categories: the selection of the study groups, comparability of the groups, and the ascertainment of the outcome of interest.

RESULTS

Our search strategy identified 982 studies of which 305 were duplicates; 677 were retained. Initial title and abstract screening lead to 7 studies. The full text of those 7 potential articles was read, and of this group of 7, 4 studies were excluded based on the inclusion criteria ([Figure 1](#)).²³ The final 3 studies were included in the qualitative synthesis of the data.

The final set consisted of studies²⁴⁻²⁶ that were retrospective cohorts and were conducted in the United States ([Table 1](#)). Medical and dental claims data from different insurance companies' databases were analyzed in each study with years ranging from 2001 through 2011. The studies' populations included adults with chronic systemic conditions. The 3 studies²⁴⁻²⁶ examined data

ABBREVIATION KEY

CAD:	Coronary artery disease.
CDT:	Code on Dental Procedures and Nomenclature.
CVD:	Cardiovascular disease.
DM:	Diabetes mellitus.
ICD9:	The International Classification of Diseases 9 th Revision.
PMPM:	Per member per month.
RA:	Rheumatoid arthritis.
T2D:	Type 2 diabetes mellitus.

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