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Does Covering Routine Dental Care for the Medicare Population Produce Cost Savings in Medicare? A Preliminary 2-Year Analysis

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Abstract

Objective: We estimated the association between the use of preventive dental care and medical use and expense for older persons over a 2-year period to determine if a Medicare dental benefit for routine care could result in potential cost savings in Medicare.

Methods: We relied on 2008–2014 Medical Expenditure Panel Survey data to estimate separate logistic and lognormal ordinary least squares regressions to analyze the influence of year 1 preventive dental care on either year 1 or year 2 use and expenses for total health care, office-based care, outpatient care, inpatient stays, emergency department visits, and prescription drugs.

Results: Our findings provide evidence over a 2-year period that a Medicare dental benefit for routine care could produce an increase in office-based visits and expense. We also found that older persons currently using routine dental care have healthier lifestyles and greater access to care and use of preventive medical care than current non-users.

Conclusion: Our results affirm the need for a longer-term study to provide any conclusive evidence as to the ultimate impact of a Medicare dental benefit on other health care use and expenses.

Keywords

Dental; Utilization; Dentistry; Insurance; Coverage; Retirement

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INTRODUCTION

Currently, Medicare makes little or no provision for dental care reimbursement. With the exception of dental care that involves more than the teeth or supporting structures, or dental care made more complicated by a concomitant medical problem, Medicare insurance generally does not pay for dental care.¹ On the other hand, some seniors are able to obtain limited dental coverage if they select Medicare Advantage.² However, even with Medicare Advantage dental coverage, seniors are likely to face high out of pocket costs due to low maximum ceilings typically imposed by these plans. The cost of a single root canal and subsequent crown will often exceed the maximum allowed payout. Furthermore, in most states adult Medicaid dental care coverage is absent or limited to emergency treatment and in the limited states that do offer some dental coverage, obtaining dental care services is often impeded by a limited number of dentists participating.³

There have been recent attempts to cover preventive dental care in Medicare. In the 2015 legislative session 2 bills were introduced that would add routine dental care coverage to Medicare: (1) H.R. 1055, the Comprehensive Dental Reform Act of 2015, and (2) S.570 a “bill to improve access to oral health care for vulnerable and underserved population.” Both bills called for a cost-benefit study of the expansion of dental services under the bill to be conducted by the U.S. Department of Health and Human Services, and each bill would have increased federal medical payments to states for oral health services under Medicaid. No cost estimates for these bills were made available from the Congressional Budget Office.^{4,5} More recently S.22 - Medicare Dental Benefit Act of 2019 was introduced in the Senate that would expand part B benefits to include routine and restorative dental coverage.^{6,7}

Building on previous studies identifying correlation between oral health care, co-morbidities, and medical expenses, our study investigates the correlation between preventive dental and health care use and expenditures. We address the hypothesis that provision of a benefit for routine dental care under Medicare can produce cost savings by lowering health care use and expenses for beneficiaries who use preventive oral health care. We further hypothesize that these cost effects may vary by type of medical care services. In particular, preventive dental care use may be positively associated with some types of medical care use, for example, office-based medical care through increased use of preventive or routine medical care services while negatively associated with inpatient hospital visits and emergency department visits by improving overall health.

Previous Studies:

Numerous studies have focused on the association between oral disease and co-morbidities. A retrospective study between 2002 and 2013 using Korean data found correlations between periodontitis and comorbidities such as cerebral infarction, angina pectoris, hypertension, and diabetes mellitus.⁸ Another retrospective cohort study examined the correlation between type of periodontal treatment and the incidence of ischemic stroke (IS) with Taiwanese data consisting of about 510 thousand persons with periodontal disease (PD) and about 208 thousand persons without PD between 2000 and 2010. The authors found that (i) the PD group with intensive periodontal treatment had a significantly lower hazard rate for IS than the non-PD control group, and (ii) that the PD group without any treatment had a

significantly higher hazard rate for IS than the non-PD control group.⁹ A comprehensive literature review provides biological and epidemiological relationships between periodontitis (PDIS) and specific comorbidities, in addition to periodontal treatment effects in some cases, for cardiovascular disease, hypertension, type 2 diabetes, rheumatoid arthritis, osteoporosis, Alzheimer's, Parkinson's, psoriasis, and pneumonia.¹⁰

Other studies have focused on the potential health care cost savings from treating oral disease for those with specific comorbidities. One such study investigated whether periodontal intervention within 2 years after diagnosis reduces the medical costs of treating 15,002 Type 2 diabetes (T2D) patients. Comparing those with periodontal treatment to those without, the authors found lower total health care costs and lower T2D-related medical costs for the treatment group.¹¹ Other authors studied the association between dental care, glycemic control, and emergency department (ED) and hospital admissions with a retrospective cohort design for a sample of about 1,000 patients enrolled in Kaiser Permanente Northwest medical and dental plans between the ages of 18 and 80. About half the sample of persons with diabetes had at least 2 visits each year between 2005 and 2007 for hygiene or periodontal treatment while the other half had none. They found after matching the cohorts on age, ED use and hospital admissions in 2005 that 2007 medical use and costs were lower for the dental care group, but there was no difference between the 2 groups in glycemic control.¹² A retrospective cohort study compared the annual per person medical costs and hospitalizations between 2005 and 2009 for those with periodontal disease who did and did not complete periodontal treatment in 2005 for those with 4 specific comorbidities identified between 2011 and 2013: type 2 diabetes, coronary artery disease (CAD), cerebral vascular disease (CVD), and rheumatoid arthritis (RA). With the exception of RA, those completing treatment for periodontal disease had statistically significant reductions in medical costs and hospitalizations over the 5-year period.¹³ A recent study estimated cost savings of \$63.5 billion to Medicare beneficiaries with heart disease, diabetes, or stroke by hypothetically offering coverage for periodontal care including an initial treatment and follow-up annual maintenance visits over the period 2016 to 2025.¹⁴

A study using 2002 Medicare Current Beneficiary Survey data found higher cost non-preventive dental use and expenditures for Medicare dental patients who did not receive preventive oral services compared to those who did receive preventive care.¹⁵ Another more recent study with the 2014 Medical Expenditure Panel Study also found that older persons using routine dental services were less likely to need expensive specialized services for restorative, oral surgery, and prosthetic dental care.¹⁶ Both of these studies found that lower income, less educated, less healthy, minority elderly were least likely to go to a dentist during the year for routine oral health care.

There are mixed opinions regarding whether preventive medical care lowers the cost of expensive medical procedures.^{17,18,19} One study modeled increasing the use of 20 preventive behaviors such as immunizations, cholesterol screening, hypertension screening, and smoking cessation counseling from current levels to 90%. They estimated savings of 3.7 billion dollars in 2006, but this represented only 0.2% of U.S. personal health expense spending in that year.²⁰

The longitudinal studies reviewed above have established correlation between treating periodontitis and lowering medical costs of treating specific chronic conditions such as diabetes and heart disease. There appears to be a void in the literature for longitudinal studies of the relation between preventive medical care and expensive medical services as well as any studies of the relation between preventive dental care and medical care use and expenditures. Our study is an attempt to address the latter subject with limited 2-year longitudinal data.

METHODS

Data:

For our study we used a subset of 18,464 non-institutionalized, community-based dentate (with teeth) adults aged 50 years and older from the 2008–2014 Medical Expenditure Panel Survey (MEPS). The MEPS is a nationally representative household survey sponsored by the Agency for Healthcare Research and Quality in the Department of Health and Human Services. The MEPS collects detailed information about medical and dental visits, health insurance, expenditures, and payments as well as socio-demographic characteristics of the U.S. community-based population. MEPS respondents are interviewed 5 times over a 2-year period.¹³ Persons in our sample were restricted to those with positive-valued population weights in both years they were in the MEPS, so we excluded persons in their first year in the survey in 2014 and in their last year in the survey in 2008. We include persons aged 50 to 64, who are more likely to have dental insurance coverage, to compare dental care use and expenditures of elders aged 65 and over.²²

We used the 2008–2014 MEPS consolidated full-year household and dental event public use files to extract the data for our analysis. The dental event file provides detailed information on each dental visit during the year including the type of dental provider and type of services used in addition to the amounts paid by various sources. From this file we constructed binary-coded variables for our study to identify 3 groups in our sample: (i) those with at least one preventive dental visit during the year involving a cleaning, prophylaxis, or polishing; a general examination, checkup or consultation; x-rays, radiographs, or bitewings; fluoride treatment; or sealant, (ii) those with at least one dental visit during the year but none involving any preventive dental care; and (iii) those without any dental visits during the year.

Andersen's behavioral model of health services use was the theoretical basis for selecting the independent variables in our models of health care use and expense. These independent variables were constructed from the MEPS consolidated full-year household file.^{23–27} Specifically we considered enabling variables (medical insurance coverage, dental insurance coverage, and family income), need variables (physical and mental health status, presence of any physical functioning limitations, number of medical diagnoses, and number of physical difficulties), and predisposing variables (age, sex, race/ethnicity, educational attainment, marital status, retirement and labor force status, census region, family size, perceived frequency of dental checkups, and any use of preventive dental care). Perceived frequency of dental checkups is ascertained from responses to a single question asked once per year in the MEPS about how frequently the persons gets a dental checkup. In contrast, actual preventive dental care use is ascertained from detailed questions in each MEPS interview round about

the dates and services for every dental visit. Persons with dental insurance are identified by a positive response to a direct question regarding this coverage or by reporting any third party payment source for any dental event during the year such as private insurance, Medicaid, VA or CHAMPVA, TRICARE, or other private or federal, state, or local public payment. Medical insurance coverage consists of those without Medicare split into those with any private coverage, public coverage only, and uninsured, and those with Medicare coverage divided into those with Medicare only, or Medicare and any private supplemental coverage or Medicare and only public supplemental coverage.

Estimation:

To identify factors correlated with older dentate persons with preventive dental care as defined above, only non-preventive dental care, or no dental care, we estimated bivariate mean differences in covariates and medical use and expenses among these 3 groups. We then used separate weighted logistic and lognormal ordinary least squares regression models to estimate the potential influence of actual and perceived use of preventive dental care on the likelihood of medical care use and the log of medical expense by type, conditional on non-zero expense, respectively, after controlling for other potentially confounding variables. Using the natural log of expenditures places relatively little weight on higher expenditure values that could be outliers or could skew the results, and it also enables interpreting coefficient values as percentage changes in spending instead of a dollar value change. In the same models we also estimated the potential influence of using preventive dental care in year 1 of the MEPS on year 2 medical care use and expense. All dollar values for medical expenditures across the multiple years of the MEPS were inflated to 2014 values by use of the medical services component of the Consumer Price Index. The MEPS core sample designs are multistage area probability ones, so all estimates and statistics reported were computed with sample weights and taking into account this complex design with the use of the software packages SUDAAN and STATA.^{28,29} In general, only estimates significant at least at the 5% level are discussed.

RESULTS

Overview:

Nearly half (49.1% or 16.9 million) of the 34.5 million older dentate adults in our study had at least one preventive dental visit in the first year they were in the MEPS. Only about 5% or 1.8 million had only non-preventive dental care during that year, while 45.6% or 15.7 million had no dental care. (Table 1) Nearly 90% of the 58.1% of the population not on Medicare but with preventive dental care had private health insurance coverage, while only 59% of the 40% of the preventive dental care population 65 and over and on Medicare had private supplemental health insurance coverage. (Table 1)

Unadjusted Characteristics of Dental Users:

Socio-economic, Demographic Factors: To establish a profile of older dentate persons using preventive dental care, bivariate mean comparisons for dentate older adults within each independent variable category are provided across the 3 subgroups defined above for those with preventive dental care, only non-preventive dental care, and with no

dental care during the year. (Table 1) Compared to the other 2 groups, those using preventive dental care are least likely to be uninsured and most likely to have private health insurance if not on Medicare, and are less likely to be under 65 and more likely to have private supplemental coverage than those without any dental use if on Medicare. Compared to the other 2 groups, preventive dental care users are most likely to be married in a 2-person family, white, non-Hispanic, with at least a college degree, living in the Midwest, in excellent or very good physical and mental health, covered by dental insurance, high income, perceived as having dental check-ups at least twice a year or more, and without any physical functioning limitations, traits similar to the typical member of this population. Conversely, those without preventive dental care are more likely to have worse health and lack dental insurance and private health insurance coverage, lower incomes, less education, and perceive they have less frequent dental checkups, and are most likely to be members of minority race/ethnic groups compared to those using preventive dental care.

Medical Use and Expense: Given the worse health of those without, compared to those with, preventive dental care, one would expect them to have a greater need for medical care as measured by their annual health care use and expense. We did not find that to be the case on 2 measures of utilization: office-based visits and outpatient provider visits. In both cases persons using preventive dental care had higher average use than that of the other 2 groups. (Table 2) We also note that preventive dental users had fewer mean annual trips to the emergency room (0.18) than those without any dental care (0.22), and fewer mean annual prescription medications (22.07) than those with only non-preventive dental care during the year (25.23).

Consistent with the utilization results, mean annual medical expenses for office-based visits and outpatient care were higher for preventive dental users than for the other 2 groups, perhaps reflecting a higher propensity to use health-related care. Despite lower use of prescription drugs, those with preventive dental care had higher mean annual prescription expenses (\$1,958) than those for persons without any dental care (\$1,689). Similarly, mean annual total health care expenses for preventive dental care users (\$8,537) are considerably higher than those for non-users of dental care (\$6,922). Annual average inpatient hospital use and expense, as well as emergency room expenses, were no different for preventive dental users compared to the other 2 groups not using preventive dental care. (Table 2)

Adjusted Estimates:

Estimated logistic and lognormal ordinary least squares regressions show the relationship between receiving year 1 preventive dental care and year 1 medical use and expense after controlling (or adjusting) for other potentially confounding variables in the equations. As in Table 1 we group the adjusted results for total health care use and expense below by the 3 general categories of theorized independent variables in our behavioral model: enabling, need and predisposing factors.

Covariates: Enabling factors show that health insurance coverage and high income contribute to a greater likelihood of having health care use, and higher total health care expenses for those with use, during the year. (Table 3) Need factors show that older dentate

persons with worse health and more medical diagnoses also have a higher likelihood of using medical services and greater medical expenses given use. Being limited in physical functioning and having numerous physical difficulties is similarly associated with higher conditional medical expenses. Predisposing factors show higher conditional expenses for those who are 75 years and older, high school graduates, and retired in comparison to their counterparts. Those having a higher likelihood of incurring health care expense and greater expense given use include women, single person family units, white non-Hispanics, and those not retired and not in the labor force. (Table 3)

Actual and Perceived Preventive Dental Care: Consistent with our unadjusted results in Table 2, we found that those who used preventive dental care during year 1 compared to those who did not are more likely to incur year 1 medical expense and have greater such expenses conditional on use. The same results were found for those who perceive themselves as having dental checkups at least twice a year compared to those who claim to only go in for checkups once a year, less often, or never. (Table 3)

Medical Use and Expense by Type: We also examined the relationships between year 1 independent variables for actual and perceived dental care and year 1 dependent variables in the regressions for use and expense of medical care by type using the same regression models. (Table 4) Estimated coefficients for the other covariates in the lognormal OLS and logistic regressions, which are the same as in the total health care expense regressions discussed above, are not reported.

Consistent with the unadjusted results, we found that preventive dental care users compared to non-users are more likely to utilize office-based provider visits and outpatient care, as is the case for those who perceive having dental checkups twice a year or more compared to those having them only once a year or less. Similarly, actual use and perceived use of preventive dental care are both positively associated with a greater number of office-based visits and expenses. Interestingly, unlike the unadjusted results, actual or perceived preventive dental care had no impact on outpatient department visits or expense for those with outpatient care in the regressions.

Actual use and perceived use of preventive dental care are both correlated with a greater likelihood of using prescription medicines, but unlike the unadjusted results, actual use of preventive dental care has no statistically significant correlation with the number of prescriptions or their expense for those using prescription drugs.

In nearly all cases, in conformity with the unadjusted results in Table 2, there is no association between the use of preventive dental care and hospital and emergency room use and expense. Similarly we find no relationship between perceived frequency of dental checkups and these types of medical care use and expense. (Table 4)

Year 2 Results: Interestingly, patterns of statistical significance for actual year 1 preventive dental care coefficient estimates remained the same in year 2 logistic equations for any health care, any office-based visit, any outpatient use, and any prescription medicine equations, although the magnitude of the estimated coefficients was somewhat smaller.

(Table 5) Similarly, the same can be said for the OLS coefficients for actual year 1 preventive dental care in year 2 total health care expense and office-based visit and expense equations. (Table 5)

DISCUSSION

Our preliminary 2-year time frame investigation does not provide evidence that a Medicare dental benefit covering routine care would have cost savings by lowering medical care use and expense of the elderly. We instead found that annual use of preventive dental care by older dentate persons is correlated with higher annual use and expense for office-based visits and, as a result, with higher overall health care utilization and expenditures. Despite the findings in our previous cross-sectional research that those using annual routine dental care use fewer expensive specialized dental services and spend less on them than those without routine dental care,^{15,16} we failed to find any differences in medical care use and expense between the 2 groups apart from office-based visits and a higher likelihood, but no greater expense, for outpatient visits.

To further investigate this result, we found that older persons receiving routine dental care are more likely to: have medical checkups and flu vaccinations within the past year, ever have a colonoscopy, exercise moderately or vigorously 5 times a week, have a normal Body Mass Index (BMI) measure, currently not be a smoker, disagree that one can overcome ills without medical help, and have a usual source of medical care provider. (Table 6) This suggests that their higher medical expenses are explained at least in part by their greater access to care and their greater use of preventive office visits and procedures, as well as their taste for healthy life styles designed to monitor their health and avoid expensive surgeries and hospitalizations from untreated or undiagnosed chronic conditions. A question remains as to whether or not these investments in health will pay off in future years in terms of longevity and less need for expensive specialized medical services. The MEPS has only 2 years of data on each older person, and our preliminary analysis of year 2 medical care use and expense as a function of year 1 preventive dental care was far from conclusive and did not change our contemporaneous findings.

Another question that remains unanswered is whether older beneficiaries currently without regular routine dental care will behave like those currently with such care by exhibiting the same propensities to utilize preventive medical care and healthy lifestyles. If so, then one might expect a spike in their office-based outpatient visits and expenditures as our findings show for those currently using routine dental care. However the markedly different lifestyles, access to care, and characteristics, on average, of those currently without routine dental care from those with such care would suggest that it might require much more than a Medicare dental benefit to instill such behavior. If this is true, then such a benefit may not produce a short term spike in health care use and expense, but instead a potentially longer term increase as chronic conditions go undetected and require future higher cost surgeries and hospitalizations. Furthermore, our previous research with the MEPS found that those older persons currently without regular dental care exhibit worse oral health and higher need for specialized dental services once they see a dentist compared to those with regular dental

care.¹⁶ A limitation of this study is that we did not control for oral health status for these older persons which could also affect their general health and use of health care.

As the results in Table 6 suggest, unobserved confounders such as tastes for medical care and access to medical care may contribute to the positive correlations between use of preventive dental care and medical care in our estimates despite the extensive number of independent variables specified in our models. As discussed above, previous studies established associations between oral health treatments and lower likelihoods of comorbidities and health care expenses, but they relied on considerably more years of longitudinal data than the 2 years that were available from the MEPS for our study. A longer term, longitudinal study will be required to provide any conclusive evidence as to the potential for cost savings in lowering medical use and expenditures from a Medicare dental benefit.

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References

1. US Department of Health and Human Services (2013). Medicare Dental Coverage (Centers for Medicare & Medicaid Services: Baltimore, Maryland). Available at: <https://www.cms.gov/Medicare/Coverage/MedicareDentalCoverage/index.html>
2. Norris L (2015) Dental coverage: What to expect from Medicare. [Medicare resources.org](https://www.medicareresources.org/blog/2015/07/16/dental-coverage-what-to-expect-from-medicare/). Available at <https://www.medicareresources.org/blog/2015/07/16/dental-coverage-what-to-expect-from-medicare/>
3. Ragovin H (2016) Dental Woes of an Aging Population. TuftsNow (Tufts University, Medford, MA). Available at <http://now.tufts.edu/articles/dental-woes-aging-population>
4. [Govtrack.us](https://www.govtrack.us/congress/bills/114/hr1055/summary) (2015) H.R. 1055: Comprehensive Dental Reform Act of 2015. Congressional Research Service, Library of Congress, Washington, D.C. Available at <https://www.govtrack.us/congress/bills/114/hr1055/summary>
5. [Congress.gov](https://www.congress.gov/bill/114th-congress/senate-bill/570/all-info) (2015) All Bill Information (Except Tex) for S.570 – Comprehensive Dental Reform Act of 2015. 114th Congress (2015–2016), Library of Congress, Washington, D.C. Available at <https://www.congress.gov/bill/114th-congress/senate-bill/570/all-info>
6. [Congress.gov](https://www.congress.gov/bill/116th-congress/senate-bill/22/text) (2019) S.22 Medicare Dental Benefit Act of 2019, 116th Congress (2019–2020). Available at <https://www.congress.gov/bill/116th-congress/senate-bill/22/text>
7. Media Resources, Press Releases and Statements (2019), Cardin Seeks to Expand Medicare to Include Dental Benefits. Available at <https://www.cardin.senate.gov/newsroom/press/release/cardin-seeks-to-expand-medicare-to-include-dental-benefits>
8. Lee J-H, Lee J-S, Park J-Y, Choi J-K, Kim D-W, Kim Y-T, & Choi S-H (2015). Association of Lifestyle-Related Comorbidities With Periodontitis: A Nationwide Cohort Study in Korea. *Medicine*, 94(37), e1567. 10.1097/MD.0000000000001567 [PubMed: 26376407]
9. Lee Y-L, Hu H-Y, Huang N, Hwang D-K, Chou P, Chu D. Dental prophylaxis and periodontal treatment are protective factors to ischemic stroke. *Stroke*. 2013; 44: 1026–1030. [PubMed: 23422085]
10. Holmstrup P, Damgaard C, Olsen I, Klinge B, Flyvbjerg A, Nielsen CH, & Hansen PR (2017). Comorbidity of periodontal disease: two sides of the same coin? An introduction for the clinician. *Journal of Oral Microbiology*, 9(1), 1332710. 10.1080/20002297.2017.1332710 Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5508374/> [PubMed: 28748036]

11. Nasseh K, Vujicic M, Glick M. The relationship between periodontal interventions and healthcare costs and utilization. Evidence from an integrated dental, medical, and pharmacy commercial claims database. *Health Econ.* 2017; 26(4): 519–527 [PubMed: 26799518]
12. Mosen DM, Pihlstrom DJ, Snyder JJ, Shuster E. Assessing the association between receipt of dental care, diabetes control measures and health care utilization. *The Journal of the American Dental Association.* 2012; 143(1): 20–30. [PubMed: 22207663]
13. Jeffcoat MK, Jeffcoat RL, Gladowski PA, Bramson JB, Blum JJ. Impact of periodontal therapy on general health. *Am J of Prev Med.* 2014; 47(2): 166–174. [PubMed: 24953519]
14. Avalere Health. Evaluation of cost savings associated with periodontal disease treatment benefit. Memorandum to Pacific Dental Services Foundation. 1 4, 2016. Available at: http://pdsfoundation.org/downloads/Avalere_Health_Estimated_Impact_of_Medicare_Periodontal_Coverage.pdf
15. Moeller JF, Chen H, Manski RJ. (2010) Investing in preventive dental care for the Medicare population: a preliminary analysis. *American Journal of Public Health.* 100(11): 2262–2269. [PubMed: 20864712]
16. Moeller JF, Chen H, Manski RJ. (2019) Diversity in the use of specialized dental services by older adults in the United States. Forthcoming in the *Journal of Public Health Dentistry.*
17. Goodell S, Cohen JT, Neumann PJ. (2009) Cost savings and cost-effectiveness of clinical preventive care. Research Synthesis Report #18: Robert Wood Johnson Foundation. Available at <https://www.rwjf.org/en/library/research/2009/09/cost-savings-and-cost-effectiveness-of-clinical-preventive-care.html>
18. Carroll AE. (2018) Preventive care saves money? Sorry too good to be true. *New York Times,* 1/29/2018 Available at <https://www.nytimes.com/2018/01/29/upshot/preventive-health-care-costs.html>
19. Amadeo K (2018) Why preventive care lowers health care costs. Available at <https://www.thebalance.com/preventive-care-how-it-lowers-aca-costs-3306074>
20. Maciosek MV, Coffield AB, Flottemesch TJ, Edwards NM, Solberg LI. (2010) Greater use of preventive services in U.S. health care could save lives at little or no cost. *Health Affairs.* 29(9): 1656–1660. Available at <https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2008.0701> [PubMed: 20820022]
21. US Department of Health and Human Services (2009). Medical Expenditure Panel Survey Data Overview (Agency for Healthcare Research and Quality). Available at: https://meps.ahrq.gov/data_stats/data_overview.jsp
22. Manski RJ, Moeller JF, Schimmel J, St.Clair PA, Chen H, Magder L, Pepper JV. (2010) Dental care coverage and retirement. *Journal of Public Health Dentistry.* 70(1)1–12. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2864343/> [PubMed: 19694939]
23. Andersen RM, Newman JF. Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly– Health and Society* 1973;51(1):95–124.
24. Aday LA, Andersen RM. Equity to access to medical care: a conceptual and empirical overview. *Med Care* 1981;19(supplement):4–27.
25. Andersen RM. (1995) Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav,* 36(1): 1–10. [PubMed: 7738325]
26. Andersen RM, Davidson PI. (1997) Ethnicity, aging, and oral health outcomes: a conceptual framework. *Adv Dent Res;* 11(2): 203–209. [PubMed: 9549985]
27. Andersen RM, Davidson PL. (2001) Improving access to care in America: individual and contextual indicators. In: Andersen RM, Rice TH, Kominski EF, editors. *Changing the U.S. health care system: key issues in health services, policy, and management.* San Francisco, CA: Jossey-Bass; pp. 3–30. Available at: https://www.researchgate.net/publication/237675193_Improving_access_to_care_in_America_Individual_and_contextual_indicators
28. Research Triangle Institute (1995). SUDAAN Software for analysis of correlated data. Release 6.40. Research Triangle Park, NC: Research Triangle Institute.
29. Statacorp (2001). *Stata Statistical Software: Release 7.0.* College Station, TX: Stata Corporation.

Table 1.

Covariate Means by Use of Dental Care, Dentate Individuals 50 Years of Age and Older: Medical Expenditure Panel Survey, 2008–2013

Variable	Total	With Preventive Dental Visit	Only Non-Preventive Dental Visits	No Dental Visits
<i>Number of Persons</i>	34,467,389	16,930,829	1,835,972	15,700,589
<i>Enabling Variables</i>				
<i>Age/Medicare Insurance Status, %</i>				
No Medicare	58.25 (0.68)	58.06 (0.94)	56.55 (2.06)	58.65 (0.77)
Uninsured	7.91 (0.29)	3.34 ^Y (0.22)	6.84 ^X (1.06)	12.97 (0.51)
Public Only	1.59 (0.09)	0.78 ^X (0.10)	1.13 ^X (0.26)	2.51 (0.16)
Any Private	46.24 (0.71)	52.19 ^Y (0.94)	45.49 ^X (2.23)	39.91 (0.84)
Medicare	41.75 (0.68)	41.94 (0.94)	43.45 (2.06)	41.35 (0.77)
Under 65	3.91 (0.19)	2.15 ^Y (0.20)	3.88 ^X (0.78)	5.81 (0.28)
65–74, Medicare Only	7.64 (0.31)	6.62 ^X (0.43)	8.22 (0.95)	8.68 (0.45)
65–74, Private	12.45 (0.40)	15.10 ^X (0.63)	12.79 ^X (1.31)	9.55 (0.42)
65–74, Other Public	2.46 (0.16)	1.87 ^X (0.18)	1.64 ^X (0.36)	3.20 (0.25)
75+, Medicare Only	6.00 (0.31)	6.09 (0.42)	5.07 (0.88)	6.01 (0.34)
75+, Private	7.21 (0.41)	8.50 ^X (0.55)	9.36 ^X (1.43)	5.55 (0.37)
75+, Other Public	2.09 (0.16)	1.62 (0.17)	2.50 (0.59)	2.55 (0.23)
<i>Dental Insurance Coverage, %</i>	49.51 (0.65)	66.38 ^Y (0.90)	58.10 ^X (2.04)	30.31 (0.80)
<i>Family Income, %^d</i>				
Poor	8.03 (0.29)	4.85 ^Y (0.31)	6.88 ^X (0.75)	11.58 (0.47)
Low Income	15.63 (0.48)	10.54 ^Y (0.51)	14.05 ^X (1.37)	21.30 (0.65)
Middle Income	27.08 (0.54)	23.85 ^X (0.77)	27.58 (1.80)	30.50 (0.65)
High Income	49.27 (0.79)	60.76 ^Y (0.90)	51.49 ^X (2.00)	36.61 (0.86)
<i>Need Variables</i>				

Variable	Total	With Preventive Dental Visit	Only Non-Preventive Dental Visits	No Dental Visits
Health Status, %				
Excellent, Very Good	53.34 (0.56)	60.67 ^Y (0.75)	53.06 ^X (2.00)	45.45 (0.77)
Good	30.56 (0.42)	28.46 ^X (0.64)	29.10 ^X (1.84)	32.99 (0.65)
Fair, Poor	16.11 (0.39)	10.86 ^Y (1.52)	17.84 ^X (1.52)	21.56 (0.59)
Mental Health Status, %				
Excellent, Very Good	65.67 (0.53)	71.06 ^Y (0.61)	63.40 (2.16)	60.14 (0.78)
Good	26.23 (0.48)	23.21 ^Y (0.57)	28.14 (1.91)	29.28 (0.74)
Fair, Poor	8.09 (0.26)	5.74 ^Y (0.30)	8.46 (1.12)	10.59 (0.40)
Any Limitation in Physical Functioning, %	20.91 (0.49)	18.39 ^Y (0.72)	22.02 (1.57)	23.49 (0.61)
Predisposing Variables				
Women, %	52.64 (0.33)	54.83 ^X (0.49)	55.04 ^X (1.79)	50.00 (0.56)
Race/Ethnicity, %				
White, Non-Hispanic	77.69 (0.86)	86.41 ^Y (0.71)	76.50 ^X (1.56)	68.42 (1.17)
Black, Non-Hispanic	8.75 (0.47)	4.87 ^Y (0.33)	8.59 ^X (0.93)	12.95 (0.68)
Hispanic	8.28 (0.57)	4.44 ^Y (0.32)	8.03 ^X (0.93)	12.46 (0.94)
Other, Non-Hispanic	5.28 (0.51)	4.28 ^Y (0.47)	6.88 (1.05)	6.17 (0.65)
Marital Status, %				
Married	63.27 (0.69)	67.47 ^Y (0.91)	63.03 ^X (1.93)	58.76 (0.81)
Widowed, Divorced, Separated	29.67 (0.60)	26.13 ^Y (0.78)	31.12 (1.91)	33.31 (0.74)
Never Married	7.07 (0.23)	6.39 ^X (0.34)	5.85 ^X (0.66)	7.93 (0.32)
Family Size, %				
One Person	25.39 (0.60)	24.71 (0.82)	27.74 (1.84)	25.84 (0.70)
Two Persons	51.95 (0.61)	56.85 ^Y (0.80)	50.76 (2.24)	46.81 (0.70)
Three or More Persons	22.66 (0.51)	18.44 ^X (0.61)	21.49 ^X (1.84)	27.34 (0.71)

Variable	Total	With Preventive Dental Visit	Only Non-Preventive Dental Visits	No Dental Visits
Educational Attainment, %				
Less than High School Degree	6.98 (0.28)	2.96 ^y (0.20)	5.53 ^x (0.69)	11.50 (0.44)
High School Degree	52.39 (0.69)	48.29 ^y (1.00)	56.48 (2.03)	56.32 (0.82)
College Degree and Beyond	36.71 (0.76)	47.14 ^y (1.03)	34.31 ^x (2.07)	25.73 (0.73)
Census Region				
Northeast	18.69 (0.79)	19.25 (1.06)	20.57 (1.55)	17.86 (0.86)
Midwest	22.34 (0.75)	24.94 ^y (1.01)	21.01 (1.69)	19.69 (0.78)
South	36.11 (0.94)	32.42 ^x (1.19)	36.84 (2.49)	40.00 (1.02)
West	22.86 (0.83)	23.38 (1.06)	21.58 (2.24)	22.44 (0.94)
Retirement, Labor Force Status, %				
Not Retired, In the Labor Force	55.67 (0.63)	57.23 ^x (0.87)	54.65 (2.24)	54.09 (0.72)
Retired	25.23 (0.64)	28.90 ^x (0.86)	26.98 (2.02)	21.06 (0.61)
Not Retired, Not in the Labor Force	10.60 (0.34)	7.72 ^y (0.37)	10.72 ^x (1.28)	13.69 (0.51)
Frequency of Dental Checkups, %				
Twice a Year or More	50.40 (0.64)	79.17 ^y (0.60)	52.37 ^x (2.18)	19.15 (0.63)
Once a Year	19.59 (0.41)	15.27 ^y (0.52)	25.61 (1.63)	23.56 (0.60)
Less than Once a Year	18.59 (0.43)	4.67 ^y (0.27)	15.73 ^x (1.26)	33.93 (0.75)
Never Go to Dentist	11.42 (0.34)	0.89 ^y (0.11)	6.29 ^x (1.14)	23.37 (0.67)

Note. Based on a sample size of 18,464 dentate persons 50 years and older with positive-valued weights in both years they were in the MEPS. Of these, 7,607 had at least one preventive dental visit during the year involving a cleaning, x-ray, exam, fluoride treatment, or sealant; 953 had only non-preventive dental visits during the year; and 9,904 did not visit the dentist during the year. Mean values are based on the first year each sampled person was in the MEPS. All estimates were made with weighted sample data.

^aLow income refers to persons in families with incomes 101% to 200% of the poverty line; middle income, 201% to 400% of the poverty line; and high income, greater than 400% of the poverty line. Persons in poor families were at or below the poverty line including persons in families with negative income.

^xIndicates that the mean in the column is significantly different from the mean for the population with no dental visits during the year.

^yIndicates that the mean in the column is significantly different from the mean for the population with only non-preventive dental visits and the mean for the population with no dental visits.

Table 2.

Medical Care Variable Means by Use of Dental Care, Dentate Individuals 50 Years of Age and Older: Medical Expenditure Panel Survey, 2008–2013

Variables	Dentate Persons 50 Years and Older		
	With Preventive Dental Visit	Only Non-Preventive Dental Visits	No Dental Visits
<i>Medical Care Use in Past Year</i>			
Number of Office-based Provider Visits	11.84 ^Y (0.22)	9.11 ^X (0.47)	7.01 (0.18)
Number of Outpatient Provider Visits	0.98 ^Y (0.05)	0.64 (0.06)	0.66 (0.09)
Number of Emergency Room Visits	0.18 ^X (0.01)	0.21 (0.02)	0.22 (0.01)
Number of Hospital Discharges	0.13 (0.01)	0.12 (0.02)	0.14 (0.01)
Number of Prescription Medications	22.07 ^Z (0.42)	25.23 ^X (1.19)	21.36 (0.47)
<i>Medical Care Expenses in Past Year, \$ 2014^a</i>			
Total Health Care Expense	8,536.66 ^X (205.84)	8,015.39 ^X (423.97)	6,921.75 (265.86)
Office-Based Provider Visit Expense	2,365.83 ^Y (65.81)	1,777.27 (131.45)	1,578.66 (60.57)
Outpatient Provider Visit and Facility Expense	826.20 ^Y (45.10)	466.75 (47.22)	588.99 (71.50)
Non-MD, Non-Facility Outpatient Expense	245.41 ^Y (28.23)	103.70 (18.24)	111.86 (14.90)
ER Facility and Doctor Expense	199.84 (14.93)	239.21 (46.14)	205.79 (11.69)
Hospital Inpatient Facility and MD Expense	1,915.36 (132.86)	1,969.25 (310.51)	2,157.52 (182.31)
Prescription Medicine Expense	1,958.41 ^X (63.00)	2,050.33 ^X (141.83)	1,689.14 (53.64)

Note. Based on a sample size of 18,464 dentate persons 50 years and older with positive-valued weights in both years they were in the MEPS. Of these, 7,607 had at least one preventive dental visit during the year involving a cleaning, x-ray, exam, fluoride treatment, or sealant; 953 had only non-preventive dental visits during the year; and 9,904 did not visit the dentist during the year. Mean values are based on the first year each sampled person was in the MEPS. All estimates were made with weighted sample data.

^aMedical expenses in years between 2008 and 2013 were inflated to \$2014 by the medical services component of the Consumer Price Index.

^XIndicates that the mean in the column is significantly different from the mean for the population with no dental visits during the year.

^YIndicates that the mean in the column is significantly different from the mean for the population with only non-preventive dental visits and the mean for the population with no dental visits.

^ZIndicates that the mean in the column is significantly different from the mean for the population with only non-preventive dental visits.

Table 3.

Estimated Coefficients In Year 1 Regressions for Any Medical Care Use and Annual Medical Care Expenditure Given Use, Dentate Individuals 50 Years and Older: Medical Expenditure Panel Survey, 2008–2013

Explanatory Variable	Logistic Regression Coefficient for any Medical Use (Standard Error)	Ordinary Least Squares Coefficient for Logarithm of Medical Expense (Standard Error)
<i>Enabling Variables</i>		
<i>Health Insurance Status</i>		
Medicare & Private	1.805 ** (0.502)	0.872 ** (0.100)
Medicare & Other Public	1.168 ** (0.342)	0.945 ** (0.086)
Medicare Only	1.208 ** (0.468)	0.758 ** (0.101)
No Medicare, Private	0.909 ** (0.147)	0.721 ** (0.066)
No Medicare, Other Public Only	1.341 ** (0.354)	0.858 ** (0.141)
No Medicare, Uninsured [Ref.]	0.00	0.00
<i>Dental Insurance Coverage</i>		
Covered	-0.020 (0.138)	0.163 ** (0.037)
Not Covered [Ref.]	0.00	0.00
<i>Family Income^a</i>		
Poor [Ref.]	0.00	0.00
Low Income	0.240 (0.177)	-0.041 (0.066)
Middle Income	0.569 ** (0.166)	0.076 (0.058)
High Income	0.775 ** (0.175)	0.189 ** (0.058)
<i>Need Variables</i>		
<i>Health Status</i>		
Excellent, Very Good [Ref.]	0.00	0.00
Good	0.437 ** (0.128)	0.359 ** (0.033)
Fair, Poor	0.617 ** (0.205)	0.831 ** (0.053)
<i>Mental Health Status</i>		
Excellent, Very Good [Ref.]	0.00	0.00
Good	-0.087 (0.151)	-0.005 (0.035)
Fair, Poor	0.162 (0.241)	0.063 (0.077)

Explanatory Variable	Logistic Regression Coefficient for any Medical Use (Standard Error)	Ordinary Least Squares Coefficient for Logarithm of Medical Expense (Standard Error)
Limited Physical Functioning		
Limited	-0.013 (0.253)	0.550 ** (0.045)
Not Limited [Ref.]	0.00	0.00
Number of Physical Difficulties		
	0.158 (0.130)	0.040 ** (0.005)
Number of Medical Diagnoses		
	0.894 ** (0.065)	0.027 ** (0.002)
Predisposing Variables		
Age		
< 65 [Ref.]	0.00	0.00
65–74	-0.432 (0.459)	0.109 (0.079)
75+	-0.228 (0.526)	0.221 * (0.092)
Sex		
Women	0.690 ** (0.107)	0.135 ** (0.027)
Men [Ref.]	0.00	0.00
Race/Ethnicity		
White, Non-Hispanic [Ref.]	0.00	0.00
Black, Non-Hispanic	-0.348 ** (0.119)	-0.116 ** (0.043)
Hispanic	-0.053 (0.150)	-0.168 ** (0.042)
Other, Non-Hispanic	-0.474 ** (0.160)	-0.314 ** (0.050)
Marital Status		
Married [Ref.]	0.00	0.00
Widowed, Divorced, Separated	-0.337 * (0.133)	-0.143 ** (0.048)
Never Married	-0.146 (0.182)	-0.119 (0.066)
Family Size		
One Person [Ref.]	0.00	0.00
Two Persons	-0.431 ** (0.148)	-0.121 * (0.053)
Three or More Persons	-0.473 ** (0.149)	-0.300 ** (0.063)
Educational Attainment		
Less than High School Degree	-0.109 (0.121)	-0.193 ** (0.059)

Explanatory Variable	Logistic Regression Coefficient for any Medical Use (Standard Error)	Ordinary Least Squares Coefficient for Logarithm of Medical Expense (Standard Error)
High School Degree	-0.174 (0.174)	0.122 ** (0.027)
College Degree and Beyond [Ref.]	0.00	0.00
Census Region		
Northeast	-0.061 (0.148)	0.008 (0.039)
Midwest	-0.010 (0.159)	-0.014 (0.038)
South [Ref.]	0.00	0.00
West	-0.084 (0.128)	-0.043 (0.040)
Retirement, Labor Force Status,		
Not Retired, In the Labor Force [Ref.]	0.00	0.00
Retired	0.023 (0.189)	0.224 ** (0.038)
Not Retired, Not in the Labor Force	0.441 * (0.207)	0.388 ** (0.053)
Frequency of Dental Checkups		
Twice a Year or More [Ref.]	0.00	0.00
Once a Year	-0.340 (0.175)	-0.181 ** (0.043)
Less than Once a Year	-0.661 ** (0.162)	-0.249 ** (0.046)
Never Go to Dentist	-0.991 ** (0.183)	-0.418 ** (0.065)
Used Preventive Dental Care		
No [Ref.]	0.00	0.00
Yes	5.325 ** (0.617)	0.284 ** (0.037)

Note. Logistic regression for any medical use in first year person was in the MEPS based on a sample size of 14,724 dentate persons 50 years and older with positive-valued weights in both years they were in the survey after deleting sample with missing data. OLS regression for logarithm of annual medical expense in first year person was in the MEPS was based on a sample size of 13,631 persons. Medical expenditures in each year were inflated to 2014 by the medical services component of the Consumer Price Index. Preventive dental care is defined as having at least one visit during the first year the person was in the MEPS involving an examination, cleaning, x-ray, fluoride treatment, or sealant application. All explanatory variables are measured as of the first year the sampled person was in the MEPS. All estimates were made with weighted sample data.

^aLow income refers to persons in families with incomes 101% to 200% of the poverty line; middle income, 201% to 400% of the poverty line; and high income, greater than 400% of the poverty line. Persons in poor families were at or below the poverty line including persons in families with negative income.

** Indicates statistical significance at the 1% level.

* Indicates statistical significance at the 5% level.

Table 4.

Estimated Coefficients for Year 1 Actual and Perceived Use of Preventive Dental Care In Logistic and OLS Regressions for Year 1 Components of Medical Care Use and Expenditure, Dentate Individuals 50 Years and Older: Medical Expenditure Panel Survey, 2008–2013

Dependent Variables	Sample	Actual Use of Preventive Dental Care	Perceived Frequency of Dental Checkups		
			Once a Year	Less Than Once a Year	Never Go to Dentist
Likelihood of Medical Care Use or Expense	Percentage of Sample with Use	Logistic Regression Coefficients for Selected Independent Variables^a (Standard Errors)			
Any Office-based Provider Visits	84.5	0.565** (0.086)	-0.257* (0.110)	-0.527** (0.113)	-0.841** (0.118)
Any Outpatient Provider Visits	24.4	0.314** (0.065)	-0.089 (0.071)	-0.199** (0.083)	-0.226* (0.115)
Any Non-MD, Non-Facility Outpatient Expense	14.9	0.436** (0.074)	-0.069 (0.086)	-0.160 (0.103)	-0.095 (0.144)
Any Emergency Room Visits	13.3	0.021 (0.075)	0.112 (0.087)	0.178 (0.108)	0.136 (0.117)
Any Hospital Discharges	8.5	0.036 (0.102)	0.038 (0.111)	-0.146 (0.122)	-0.314* (0.155)
Any Prescription Medications	81.4	0.344** (0.084)	-0.222* (0.087)	-0.438** (0.097)	-0.834** (0.117)
Log of Medical Care Expenditures and Use Conditional on Use	Sample Size	Ordinary Least Squares Coefficients for Selected Independent Variables^a (Standard Errors)			
No. of Office-Based Provider Visits	12,408	0.241** (0.028)	-0.131** (0.030)	-0.183** (0.036)	-0.1242** (0.045)
Office-Based Provider Visit Expense	12,330	0.220** (0.036)	-0.142** (0.044)	-0.199** (0.047)	-0.339** (0.061)
No. of Outpatient Provider Visits	3,576	0.037 (0.037)	-0.106 (0.045)	-0.007 (0.049)	-0.069 (0.086)
Outpatient Provider Visit and Facility Expense	3,515	-0.069 (0.086)	-0.017 (0.093)	-0.104 (0.103)	0.139 (0.131)
Non-MD, Non-Facility Outpatient Expense	2,184	-0.071 (0.098)	-0.035 (0.120)	-0.108 (0.126)	0.052 (0.153)
No. of Emergency Room Visits	1,942	0.011 (0.025)	0.041 (0.028)	0.047 (0.033)	0.059 (0.044)
ER Facility and Doctor Expense	1,832	-0.153 (0.082)	0.019 (0.099)	-0.018 (0.109)	-0.110 (0.124)
No. of Hospital Discharges	1,240	-0.013 (0.027)	-0.005 (0.032)	0.008 (0.040)	-0.046 (0.046)
Hospital Inpatient Facility and MD Expense	1,233	-0.098 (0.128)	-0.099 (0.137)	-0.271 (0.168)	0.172 (0.176)
No. of Prescription Medications	11,949	0.005 (0.029)	-0.046 (0.031)	0.002 (0.036)	-0.004 (0.049)
Prescription Medicine Expense	11,942	-0.021 (0.047)	-0.145** (0.049)	-0.107* (0.054)	-0.176* (0.075)

Note. The sample size for the logistic regressions in the first panel of the table for any medical use of a given type in the first year person was in the MEPS based on a sample size of 14,724 dentate persons 50 years and older with positive-valued weights in both years they were in the survey after

deleting sample with missing data. Medical expenditures in the first year the person was in the MEPS were inflated to 2014 by the medical services component of the Consumer Price Index. All estimates were made with weighted sample data.

^aOther explanatory variables in the equations are the same as in Table 3. The reference group for actual use of preventive dental care is none. The reference group for perceived frequency of dental checkups is twice a year or more. All variables are measured as of the first year the person was in the MEPS. All variables are measured as of the first year the person was in the MEPS.

** Indicates statistical significance at the 1% level.

* Indicates statistical significance at the 5% level.

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Table 5.

Estimated Coefficients for Actual Year 1 Use of Preventive Dental Care In Logistic and OLS Regressions for Year 2 Components of Medical Care Use and Expenditure, Dentate Individuals 50 Years and Older: Medical Expenditure Panel Survey, 2008–2013

Dependent Variables	Year 1 Actual Use of Preventive Dental Care
Likelihood of Year 2 Medical Care Use or Expense	Logistic Regression Coefficients (Standard Errors)
Any Health Care Expense	0.881 ** (0.179)
Any Office-based Provider Visits	0.445 ** (0.095)
Any Outpatient Provider Visits	0.267 ** (0.064)
Any Non-MD, Non-Facility Outpatient Expense	0.313 ** (0.072)
Any Emergency Room Visits	-0.053 (0.074)
Any Hospital Discharges	-0.098 (0.088)
Any Prescription Medications	0.253 ** (0.083)
Log of Year 2 Medical Care Expenditures and Use Conditional on Use	Ordinary Least Square Coefficients (Standard Errors)
Total Health Care Expense	0.095 ** (0.035)
No. of Office-Based Provider Visits	0.164 ** (0.029)
Office-Based Provider Visit Expense	0.181 ** (0.033)
No. of Outpatient Provider Visits	0.079 (0.046)
Outpatient Provider Visit and Facility Expense	0.086 (0.099)
Non-MD, Non-Facility Outpatient Expense	0.034 (0.104)
No. of Emergency Room Visits	0.002 (0.027)
ER Facility and Doctor Expense	-0.037 (0.091)
No. of Hospital Discharges	0.013 (0.030)
Hospital Inpatient Facility and MD Expense	0.038 (0.114)
No. of Prescription Medications	-0.042 (0.039)
Prescription Medicine Expense	-0.084 (0.062)

Note. The sample size for the logistic regressions in the first panel of the table for any medical use or expense of a given type was based on a sample size of 14,724 dentate persons 50 years and older with positive-valued weights in both years they were in the survey. Medical expenditure in the second year the person was in the MEPS were inflated to 2014 by the medical services component of the Consumer Price Index. The

reference group for actual use of preventive dental care is none. Other explanatory variables in the equations are the same as in Table 3. All explanatory variables not shown are measured as of the first year the person was in the MEPS.

** Indicates statistical significance at the 1% level.

* Indicates statistical significance at the 5% level.

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Table 6.

Estimated Coefficients in Logistic Regression for Any Preventive Dental Care in Year 1, Dentate Individuals 50 Years and Older: Medical Expenditure Panel Survey, 2008–2013

Explanatory Variable	Logistic Regression Coefficient (Standard Error)
<i>Length of Time Since Last Routine Medical Checkup</i>	
Within Past Year [Ref.]	0.00
Within Past 2 or 3 Years	-0.007 (0.063)
Never or Within Past 5 Years or More	-0.295 ** (0.074)
<i>Length of Time Since Last Flu Vaccination</i>	
Within Past Year [Ref.]	0.00
Within Past 2 or 3 Years	-0.266 ** (0.078)
Never or Within Past 5 Years or More	-0.357 ** (0.051)
<i>Take Aspirin Every Day or Every Other Day</i>	
Yes [ref.]	0.00
No	-0.015 (0.040)
<i>Ever Have a Colonoscopy</i>	
Yes [Ref.]	0.00
No	-0.641 ** (0.048)
<i>Exercise Moderately or Vigorously 5 Times Per Week</i>	
Yes [Ref.]	0.00
No	-0.3248 ** (0.039)
<i>Body Mass Index (BMI)</i>	
Normal (18.5<= BMI <25) [Ref.]	0.00
Obese (BMI >30)	-0.408 ** (0.052)
Overweight (25<= BMI <=30)	-0.128 ** (0.047)
Underweight (BMI <18.5)	-0.221 (0.175)
<i>Always Wears a Seat Belt</i>	
Yes [Ref.]	0.00
No	-0.055 (0.071)
<i>Currently Smokes</i>	
Yes	-0.709 ** (0.065)
No [Ref.]	0.00

Explanatory Variable	Logistic Regression Coefficient (Standard Error)
<i>Can Overcome Ills Without Medical Help</i>	
Disagree Somewhat or Strongly [Ref.]	0.00
Uncertain	-0.164* (0.066)
Agree Somewhat or Strongly	0.065 (0.061)
<i>Has Usual Source of Medical care Provider</i>	
Yes [Ref.]	0.00
No	-0.557** (0.071)

Note. The sample size for the logistic regression is 18,201 dentate persons 50 years and older with positive-valued weights in both years they were in the MEPS, 7,541 of whom had any preventive dental care in the first year they were in the survey. Explanatory variables are also measured as of the first year the person was in the survey. Preventive dental care is defined as having at least one visit during the first year the person was in the MEPS involving an examination, cleaning, x-ray, fluoride treatment, or sealant application. Estimates were made with weighted sample data.

** Indicates statistical significance at the 1% level.

* Indicates statistical significance at the 5% level.