

STUDY ON SYSTEMIC COMPLICATIONS OF ORAL DISEASES AMONG MEDICAID BENEFICIARIES WITH TYPE 2 DIABETES IN KENTUCKY

Summary Prepared by the Office of Data Analytics Division of Analytics

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What is Known on This Topic?

Poor oral health has been associated to numerous systemic health complications. Similarly, common preexisting comorbidities - such as diabetes - often put individuals at a higher risk of oral disease, further confounding the relationship between oral and overall health.

What Did this Project Do?

Using Kentucky Medicaid claims data from 2014 to 2019, this study explored the impact of dental prophylaxis on the risk of developing complications of oral disease among beneficiaries with and without Type 2 diabetes.

What Could Medicaid Do with These Conclusions?

Health policy that targets oral health interventions among Medicaid recipients may be an important step to improving the systemic health of vulnerable populations as well as reducing financial and administrative burdens to

Introduction

Evidence for the association between oral health and the development of chronic conditions is well established in scientific literature. The underlying mechanisms of this relationship that have been studied include the discovery of microbial species in oral disease (e.g., periodontitis) and genera isolated from arterial plaques.

Regardless of the cause, broad improvements in dental care have the potential to reduce the subsequent systemic health issues that stem from poor oral health. This is an especially important consideration for Medicaid beneficiaries, as lower income populations are at higher risk

of having poor oral health, complicating comorbidities, and simultaneously face difficulties in accessing dental services.

At the time of this study, adult dental benefits under the Kentucky Medicaid system are limited to oral exams, emergency visits, X-rays, extractions and fillings. As such, the proposition of expanded coverage of preventative dental procedures may be supported by the reduction of complications in overall health that could follow.

To explore this claim further, this study examined the impact of dental prophylaxis on the risk of developing systemic complications among beneficiaries with and without Type 2 diabetes. Specifically, the diagnoses that were studied include myocardial infarction (MI), pneumonia, asthma, chronic kidney disease, rheumatoid arthritis, and hepatitis C.

Project Methods & Results

The study cohort was selected from the CHFS Medicaid dataset for years 2014-2019 and included 2,109,192 total beneficiaries. Subjects were included if age at entry into the study was ≥ 21 to ≤ 70 years of age and provided their race. This subset was then further filtered dependent on each diagnosis of interest. Specifically, subjects were excluded if they had less than one year of claims history prior to diagnosis.

The study population was then stratified into beneficiaries with type 2 diabetes (T2DM) and those without T2DM. T2DM individuals were identified using specific ICD 9 and ICD 10 codes.

The outcome variable was whether or not the complication diagnoses occurred in a Medicaid beneficiary, again, as defined by ICD-9 and ICD-10 codes. T2DM strata (with and without) included adult subjects who received dental prophylaxis treatment (CDT code D1110) prior to outcome diagnosis.

Additional independent variables included urbanicity of residence and associated Area Deprivation Index (ADI) on the county-level, typical comorbidities associated with the respective outcome diagnoses, as well as the identification of periodontal disease.

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A multivariate analysis was performed using Cox regression to evaluate the association between each outcome diagnosis and respective independent variables. The absence of dental prophylaxis was associated with increased incidence of each primary outcome diagnosis studied in this investigation: myocardial infarction, pneumonia, asthma, chronic kidney disease, rheumatoid arthritis, and hepatitis C.

Regression results for myocardial infarction are presented in Table 1. For each indicated variable, a hazard ratio (HR) less than 1 represents a decrease in the likelihood of the corresponding diagnosis, while HR greater than 1 represents an increase in likelihood. For example, dental prophylaxis was associated with a decreased likelihood of myocardial infarction relative to those who did not receive dental prophylaxis (Table 1). Regression results from each of the other chronic diseases studied can be found within the final report.

Table 1. Myocardial Infarction

Variables	HR (95% CI)	p value
Age 50+ years	1.15 (1.12 – 1.19)	<0.001
Female	0.81 (0.79 – 0.83)	<0.001
Non-white	1.06 (1.02 – 1.11)	0.007
Rural	1.04 (1.00 – 1.08)	0.030
T2DM	1.15 (1.12 – 1.19)	<0.001
Hypertension	3.86 (3.64 – 4.10)	<0.001
CKD	1.73 (1.67 – 1.78)	<0.001
Atrial fibrillation	2.03 (1.96 – 2.10)	<0.001
Dyslipidemia	2.05 (1.96 – 2.14)	<0.001
PVD	1.49 (1.44 – 1.54)	<0.001
Prophylaxis	0.51 (0.49 – 0.53)	<0.001
Tooth extraction	1.22 (1.18 – 1.27)	<0.001
ARB	0.91 (0.86 – 0.96)	0.001
ACE	0.99 (0.96 – 1.03)	0.786
Diuretic	0.90 (0.86 – 0.93)	<0.001
CaCHANNEL	1.03 (0.99 – 1.08)	0.175
Aspirin	0.63 (0.60 – 0.65)	<0.001
AntiPlatelets	1.09 (1.02 – 1.17)	0.017
Nitroglycerin	0.91 (0.85 – 0.98)	0.008
BetaBlockers	1.17 (1.12 – 1.21)	<0.001
VASO	1.18 (1.10 – 1.26)	<0.001
CABG	2.47 (2.31 – 2.63)	<0.001
CABG History	2.41 (2.31 – 2.53)	<0.001
Statin	0.75 (0.71 – 0.78)	<0.001
ABT	0.64 (0.62 – 0.67)	<0.001

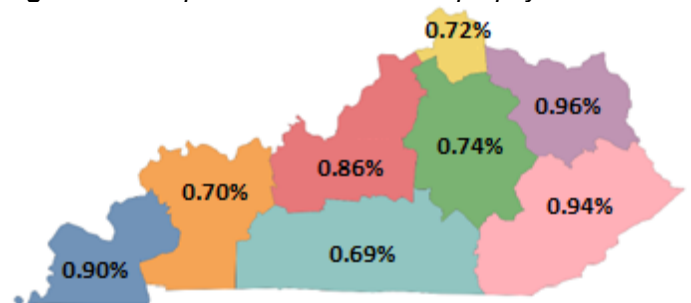
Note: Reproduced from final report p. 6.

Projected survival curves for each outcome diagnosis can be found within the final report. For each primary outcome

diagnosis, dental prophylaxis was associated with increased projected 10-year survival probability.

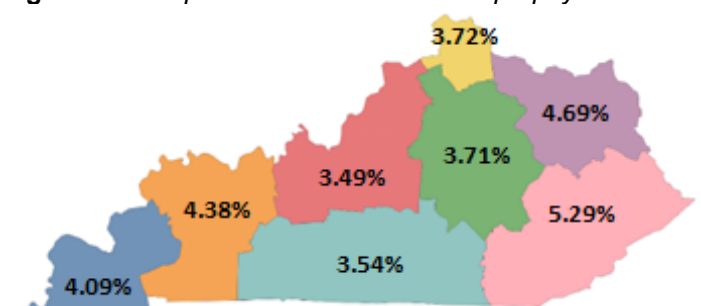
Incidence of each primary outcome diagnosis within each Medicaid region and county in Kentucky can be found in the final report. Figures 1 and 2 demonstrate the distribution of prevalence of chronic kidney disease (CKD) and end stage renal disease within each Medicaid region. CKD prevalence was found to be 4.98 times greater in the non-prophylaxis group when compared to the group that received dental prophylaxis.

Figure 1. CKD prevalence with dental prophylaxis



Note: Reproduced from final report p. 9.

Figure 2. CKD prevalence without dental prophylaxis



Note: Reproduced from final report p. 9.

Discussion and Conclusion

For all systemic health complications studied, individuals who received dental prophylaxis saw a lower risk of diagnosis. Likewise, tooth extractions were significantly associated with a greater risk of these diagnoses. Type 2 diabetes was associated with a higher risk of all complications except rheumatoid arthritis (not statistically significant) and hepatitis C (lower risk). Analyzing outcomes within each Medicaid region or county may help to assess regional disparities in the prevalence of each primary outcome diagnosis.

These findings suggest that systemic health complications may be associated with poor oral health and that dental prophylaxis may be effective at reducing associated diagnoses. As such, treatment of dental problems prospectively, before they become emergencies, are recommended to improve the health of the Kentucky Medicaid population.