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Recommended Citation

Wagner, K.; Szabo, Aniko; Okunseri, Elaye; and Okunseri, Christopher, "Billed and Paid Amounts for Preventive Procedures in Dental Medicaid" (2019). *School of Dentistry Faculty Research and Publications*. 350.

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Billed and Paid Amounts for Preventive Procedures in Dental Medicaid

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Abstract

Objective:

To examine trends and variations in billed and paid amounts for preventive dental procedures by race/ethnicity, age, and sex in Wisconsin dental Medicaid.

Methods:

We analyzed data from the 2001 to 2013 Wisconsin Medicaid claims database for preventive dental procedures for children and adults. Billed and paid amounts for preventive dental procedures were aggregated over a visit and adjusted for inflation based on the Medical Care Consumer Price Index produced by the Bureau of Labor Statistics for 2013. Quantile regression was used to examine the trends over time and the effect of patient demographics.

Result:

At the 50th and 75th percentiles, the overall billed amounts for preventive dental procedures were \$84.97 and \$105.53, and the paid amounts were \$35.80 and \$41.66, respectively. At the 75th percentile, there was a \$2.24 increase per year in the billed amount and a \$26.88 overall increase from 2001 to 2013. In the paid amount, there was a \$1.34 decrease per year for an overall \$16.07 decrease from 2001 to 2013. Billed and paid claims for racial/ethnic minority enrollees were \$1 to \$3 higher per visit at the 75th percentile when compared with those of Whites. Regarding the billed:paid ratio, White, African American, and Hispanic enrollees had values of 50% to 52%, whereas American Indians had the lowest value at 47.7%. At the 75th percentile, children aged 10 to 19 y had significantly higher billed (\$26.73) and paid (\$9.92) amounts than did adults aged 20 to 69 y.

Conclusion:

The billed amount increased over time, and the paid amount decreased after adjustment for inflation. In addition, there was a wide gap between billed and paid amounts over time.

Knowledge Transfer Statement:

This study highlights clear differences between paid and billed amounts in Wisconsin dental Medicaid. The financial health of dental practices is dependent on appropriate reimbursement for dental services provided; thus, information of this nature could serve as a proxy performance measure for access to preventive dental care. Findings from this study could be used by policy makers and dental Medicaid program managers to develop outcome metrics to improve access to preventive dental services.

Keywords

dental Medicaid, dental care, dental health services, children, adults, preventive dental procedure

Introduction

A healthy mouth is associated with improved quality of life and is integral to overall well-being, labor productivity, and employment outcomes ([Naito et al. 2006](#); [Oliveira et al. 2008](#); [Glied and Neidell 2010](#); [Singhal et al. 2013](#)). Access to preventive dental care is crucial to maintaining oral health, and preventive dental procedures are fully covered by most dental health plans, including Wisconsin dental Medicaid (BadgerCare Plus). It is well known that Medicaid reimburses providers at a lower rate than other dental plans, and dentists often receive less than the billed amount for services provided to Medicaid enrollees relative to other enrollees. Preventive dental procedures have been described as efficacious in the prevention of dental disease and other related health problems ([US Department of Health and Human Services 2000](#)). Despite the documented benefits associated with preventive dental care, many low-income individuals are hard-pressed to obtain dental care and so carry a disproportionate burden of untreated dental disease.

Medicaid is one of the largest public funding sources for dental services in the United States. Established in 1965, Medicaid is jointly funded by state and federal governments and provides health care coverage to several vulnerable populations. All state Medicaid programs are required to provide dental care coverage for children, with the option of offering it to adults. As of February 2016, 31 states and the District of Columbia provided

dental coverage to adults through their Medicaid programs ([Hinton and Paradise 2016](#)). However, dental coverage through Medicaid does not guarantee access to dental treatment, because dental providers are not required to participate in the Medicaid program and can choose to not treat patients insured through it. One study suggested that dental provider supply is insufficient to meet the demands of the Medicaid population, particularly for nonelderly adults ([Hinton and Paradise 2016](#)). One reason for this is the low reimbursement rates offered by Medicaid, and evidence suggests that higher reimbursement could increase the number of Medicaid enrollees seen ([Hughes et al. 2005](#); [Decker 2011](#); [Chalmers and Compton 2017](#)).

Methods used by providers to set prices and receive payment have changed considerably over time, but a difference still exists between what a provider bills and what a provider is actually paid. Medicaid notoriously pays less than billed rates, resulting in a gap that provides a disincentive for provider participation in the program. In 2011, the State of Wisconsin spent a total of \$65 million (<1% of total Medicaid expenditure) on dental care. In 2014, the percentage of Wisconsin licensed dentists enrolled in the Medicaid program was 37%, which was the lowest participation rate of all health care providers registered with Medicaid ([Wisconsin Dental Association 2017](#)). Among the 37%, approximately 53% were considered inactive and had a limited participation rate.

Low rate of provider participation in dental Medicaid is concerning, given the potential benefits of the program to excellent oral health. Anecdotal information suggests that low provider participation is due to lower reimbursement rates from Medicaid relative to billed amounts, but few empirical data exist on the gap between paid and billed amounts for preventive dental procedures over time. This study examines trends and variations in billed and paid amounts for preventive dental procedures by patient race/ethnicity, age, and sex in Wisconsin dental Medicaid.

Methods

The study data were extracted from the Wisconsin Medicaid Evaluation and Decision Support database for 2001 to 2013, which is managed by the Division of Health Care Financing at the Wisconsin Department of Health Services. The study was based on de-identified archival claims data. All claims data for the study were for preventive dental procedures (fluoride varnish, sealants, cleaning, etc.) and contained information regarding date of service, demographic information, billed amount, and paid amount for children and adults. The database extract defined type of enrollment (either in a fee-for-service program or through a managed care organization) for the entire Wisconsin Medicaid population. The Marquette University Institutional Review Board determined that this study does not require approval due to the nature of the data analyzed.

Statistical Analysis

Descriptive statistics were calculated to examine the trends for preventive dental procedures. Billed and paid amounts were aggregated over a visit and adjusted for inflation based on the 2013 Bureau of Labor Statistics' Medical Care Consumer Price Index. Given changes in the procedure coding system during our study period, it is unreasonable to isolate billed and paid amounts for specific procedures. Thus, our analysis is done by visit and not by procedure. Separate quantile regressions were used to examine the trends over time and the effect of various patient demographics, including race and age group. The confidence interval was constructed with Powell's kernel type sandwich estimator for standard error. Statistical analyses were performed with SAS software (version 9.2; SAS Institute Inc). An alpha level of 0.05 was used throughout to indicate statistical significance.

Results

The visit-based study population characteristics are shown in [Table 1](#). There were >2 million (2,147,539) visits in the dental Medicaid database during the study period. Most visits were made by females (55%), non-Hispanic Whites (72%), and enrollees between the ages of 0 to 9 y (41%). [Figure 1a, b](#) represents percentiles for billed and paid amounts per visit by year for the entire sample. Overall, the 50th and 75th percentile billed amounts were \$84.97 and \$105.53, and paid amounts were \$35.80 and \$41.66, respectively. The billed and paid amounts for preventive dental services showed similar patterns in growth over time, with slight increases at the 50th and 75th percentiles and more pronounced growth at the 90th, 95th, and 97.5th percentiles. Although billed and paid amounts increased, billed amounts far outpaced the growth rate of paid amounts. Between 2001 and 2013, the billed amount for the 97.5th percentile grew from \$193.26 to \$321.00, whereas the paid amount increased from \$104.74 to \$120.90 dollars.

Table 1. Visit-Based Study Population Characteristics.

	Visits	
	n	%
Sex		
Female	1,172,078	55
Male	965,461	45
Race/ethnicity		
White	1,546,749	72
Black	172,737	8
Asian	72,016	3
Native American	64,467	3
Hispanic	220,381	10
Missing	61,189	3
Age, y		
0 to 9	884,636	41
10 to 19	652,497	31
20 to 29	120,709	6
30 to 39	140,636	7
40 to 49	125,134	6
50 to 59	78,823	4
60 to 69	42,245	2
≥70	92,859	4

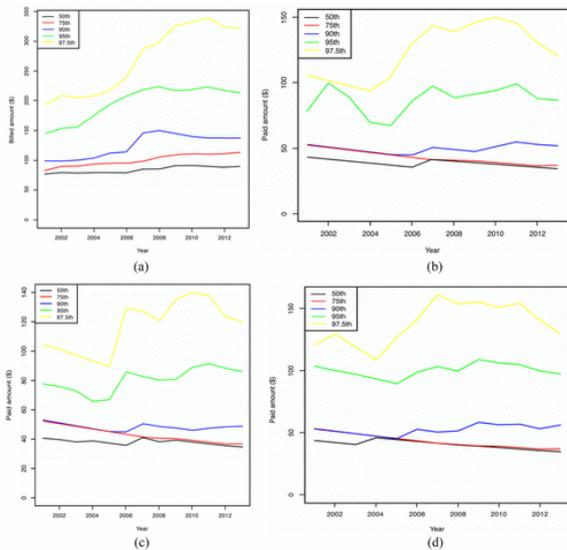


Figure 1. Percentiles of (a) billed and (b–d) paid amounts per visit by year: (b) overall, (c) female, and (d) male.

The overall trends in paid and billed amounts were consistent with the sample decomposed on the basis of race and sex. [Figure 1c, d](#) shows trends for paid amounts by males and females. There was little difference in paid and billed (figure not shown) amounts between males and females, with the average paid and billed amounts equal to \$40.28 and \$95.27 for females and \$41.93 and \$97.26 for males, respectively. These are in line with the overall paid and billed amounts, which equal to \$41.02 and \$96.17. Plotting these amounts over time revealed similar differences in growth rates for billed and paid amounts from 2001 to 2013 as seen for the overall samples. The billed amounts for males and females grew substantially from \$83.39 and \$81.39 to \$99.02 and \$97.50, respectively, while paid amounts decrease from \$49.51 and \$46.48 to \$37.82 and \$36.93. These are also consistent with the overall increase in average billed amount (from \$82.25 to \$98.21) and paid amount (from \$47.78 to \$37.35).

[Figure 2](#) shows the overall trends in billed and paid amounts for White versus non-White enrollees. On average, the billed and paid amounts for non-White enrollees were higher than that for White enrollees. As is the case in [Figure 1a, b](#), however, both samples displayed pronounced increases at the 90th, 95th, and 97.5th percentiles in the billed amount that outpaced the changes in the paid amounts. Overall, there was a notable growth in billed amounts with no corresponding growth in paid amounts.

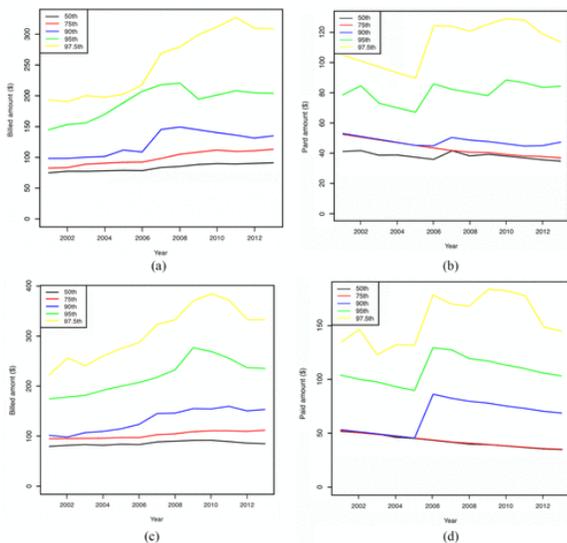


Figure 2. Percentiles of (a) billed and (b) paid amount per visit by year: White. Percentiles of (c) billed and (d) paid amount per visit by year: non-White.

[Table 2](#) shows the quantile regression analysis at the 75th percentile for the billed amount, the paid amount, and their ratio controlling for race/ethnicity, age, and year. There was a \$2.24 (95% CI, \$2.22 to \$2.26) increase per year in the 75th percentile of the billed amount, which reflects a \$26.88 (95% CI, \$26.61 to \$27.15) increase from 2001 to 2013. At the same time, there was a \$1.34 (95% CI, \$1.34 to \$1.34) decrease per year in the 75th percentile of the paid amount per year for an overall \$16.07 (95% CI, \$16.04 to \$16.11) decrease from 2001 to 2013. As a result, the percentage of the billed amount that was paid decreased 1.98% (95% CI, 1.97% to 1.99%) per year or 23.7% (95% CI, 23.6% to 23.8%) overall at the 75th percentile.

Table 2. Quantile Regression Results: Effect of Year, Race/Ethnicity, and Age on Billed, Paid, and Paid:Billed Ratio at the 75th Percentile.

	Billed			Paid			Paid:Billed Ratio		
	Est	95% CI	P Value	Est	95% CI	P Value	Est	95% CI	P Value
Year	2.24	2.22 to 2.26	<0.0001	-1.34	-1.34 to -1.34	<0.0001	-1.98	-1.99 to 1.97	<0.0001
Race/ethnicity			<0.0001			<0.0001			<0.0001
White	105.16	105.10 to 105.22		41.61	41.59 to 41.62		51.04	51.00 to 51.09	
Black	107.26	107.08 to 107.44		44.68	44.54 to 44.81		51.56	51.43 to 51.69	
Asian	107.49	107.28 to 107.69		43.45	43.33 to 43.57		49.80	49.57 to 50.03	
Native American	107.58	107.26 to 107.90		42.29	42.14 to 42.43		47.72	47.70 to 47.74	
Hispanic	106.17	106.05 to 106.29		41.61	41.54 to 41.68		51.56	51.45 to 51.67	
Age, y			<0.0001			<0.0001			<0.0001
0 to 9	102.81	102.71 to 102.90		43.45	43.41 to 43.49		53.72	53.67 to 53.78	
10 to 19	113.83	113.72 to 113.93		45.19	45.18 to 45.21		51.46	51.40 to 51.51	
20 to 29	87.15	86.96 to 87.34		35.28	35.19 to 35.37		46.15	46.07 to 46.22	
30 to 39	85.99	85.82 to 86.16		35.28	35.15 to 35.41		45.31	45.24 to 45.38	

40 to 49	86	85.87 to 86.13		35.28	35.14 to 35.41		45.65	45.51 to 45.78	
50 to 59	89.1	88.81 to 89.39		35.28	35.18 to 35.37		44.82	44.69 to 44.94	
60 to 69	97.34	96.52 to 98.15		36.81	36.73 to 36.89		44.82	44.62 to 45.02	
70 to 79	140.1	139.85 to 140.34		42.35	42.30 to 42.39		44.82	44.57 to 45.07	

Est, estimation

Racial/ethnic minority enrollees' variability at the 75th percentile of billed and paid amounts per visit was low, with \$1 to \$3 lower values for White enrollees. In terms of the billed:paid ratio, Native Americans had the lowest value at 47.7% versus 50.0% to 51.6% for White enrollees, African Americans, and Hispanic enrollees. In addition, higher billed and paid amounts were found for claims from children aged 10 to 19 y. At the 75th percentile, billed and paid amounts for children 10 to 19 y old were significantly higher (\$26.73 and \$9.92, respectively) than for 20- to 69-y-old adults.

Discussion

This study provides preliminary estimates on trends of billed and paid amounts in the Wisconsin dental Medicaid. The program provides coverage for dental examinations, prophyl or cleanings, diagnostics, restorations or fillings, crowns, extractions, and periodontal and other dental services. Licensed dentists and dental hygienists use standardized billing codes to bill for the various dental services that they provide ([Wisconsin Department of Health Services 2016](#)). Medicaid determines the reimbursement rate for each covered procedure, and this amount is not necessarily equal to what is actually billed by the provider. Nonetheless, such reimbursement rates are considered the maximum fees payable by Medicaid to the provider. The fees paid to providers are based on the amount submitted by the provider, Wisconsin State Legislature's budgetary constraints, and other potential economic limitations.

We found that on average billed amounts were higher than paid amounts, and this was not particularly surprising given the ongoing discussions in the dental community. Our results indicate, however, that there is a growing difference in the gap between billed and paid amounts in preventive dental procedures provided to Medicaid enrollees over time. From 2001 to 2013, the billed amounts showed slight increases at the 50th and 75th percentiles, with a more pronounced increase at the 90th, 95th, and 97.5th percentiles for preventive dental services. While the paid amounts did grow over time, they were outpaced by the growth in the billed amounts. The difference in growth rates between billed and paid amounts was consistent when broken down by race and sex.

The small change in paid amounts over time is consistent with the method by which Medicaid reimburses providers given that Wisconsin pays a fixed amount to providers per procedure for treating its Medicaid enrollees. There was a significant difference, however, between what Medicaid pays and what is billed. The significant widening of the gap between billed and paid amounts over time raises many questions and, possibly, policy and program implications. The trends shown by our analysis strengthen the need to improve our understanding of how the billed-paid gap could affect access to preventive dental services for dental Medicaid enrollees, provider participation, and quality of treatment. To the best of our knowledge, this is the first article that attempts to shed some light on trends and variations in Medicaid billed and paid amounts for preventive

dental procedures by race/ethnicity, age, and sex over time. The margin of difference was surprising given that preventive dental procedures are generally covered under almost all dental insurance plans, including dental Medicaid.

Some of the limitations of our study prevent us from investigating potential impacts of a widening billed-paid amount gap. First, our data contain information only for Medicaid enrollees' visits, meaning that we cannot evaluate any differences in billed and paid amounts for enrollees with other types of dental insurance. Second, our data do not contain any quality measures that could be used to evaluate provider or dental plan performance. Given this limitation, we cannot explore whether the widening billed-paid amount gap is associated with any changes in patient outcomes. Third, our data do not allow us to identify provider participation, meaning that we cannot explore if the widening gap deters dentists from accepting Medicaid enrollees. However, low Medicaid reimbursement has been documented as a barrier to dentists' participation in the program. These potential impacts would be of primary interest to us in future work, but our current data do not allow for these types of analyses.

Also documented in this study are racial and ethnic variabilities at the 75th percentile for billed and paid amounts per visit. As compared with White enrollees, racial and ethnic minorities had higher billed and paid amounts of \$1 to \$3. However, this difference has little or no clinical significance in the provision of dental care. In terms of the billed:paid ratio, when compared with the 52% for White enrollees, African Americans, and Hispanic enrollees, American Indians had a lower value at 47.7%. Although these racial disparities seem economically insignificant, the results for race/ethnicity variation should be included in the list of concerns associated with inequalities in dental care. The racial/ethnic variation could possibly be linked to the process by which enrollees become eligible for the Medicaid program. For example, Black and Hispanic enrollees are more likely to qualify for coverage through Medicaid (known as BadgerCare Plus in Wisconsin). Since the current data do not allow classification of eligibility categories in terms of hierarchy, it is difficult to make any further deduction regarding this potential contributor to racial and ethnic variations. The presence of discrimination could be another potential explanation for the differences based on race and ethnicity. Unfortunately, the available data do not allow us to test any hypothesis related to discrimination.

Overall, we demonstrated a clear, widening gap between billed and paid amounts for the provision of preventive dental services, as well as higher percentiles of visit costs in Wisconsin Medicaid. Although visit costs in the higher percentiles were not as common, they tended to be more expensive and could have worse health outcomes if left untreated. Results from our study could be suggestive of similar or greater gaps that exist in nonpreventive dental procedures for enrollees covered by different types of dental insurance plans. In particular, individuals with no dental insurance may be vulnerable if they are expected to pay the full billed amounts, since they have no insurance company to negotiate different allowable/paid amounts on their behalf. Policy makers and dental insurance plans should ensure that disparities in access to, and treatment for, dental care are not present due to a widening billed-paid amount gap. Future research should explore the impact of a widening billed-paid gap in the reimbursement for dental procedures, as well as in treatment quality, and the differences in dental health equity for racial and ethnic minority populations.

Author Contributions

K. Wagner, contributed to conception, design, and data analysis, drafted and critically revised the manuscript; A. Szabo, contributed to conception, design, data acquisition, analysis, and interpretation, drafted and critically revised manuscript; C. Zheng, contributed to design, data analysis, and interpretation, drafted and critically revised the manuscript; E. Okunseri, contributed to conception, data acquisition, and interpretation, drafted and critically revised the manuscript; C. Okunseri, contributed to conception, design, and data acquisition, drafted

and critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

Authors' Note

An abstract from this study was presented as an oral presentation at the meeting of the International Association for Dental Research, London, United Kingdom, July 2018.

The project was supported by grant 1R03 DE027159-01 from the National Institute of Dental and Craniofacial Research, National Institutes of Health.

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

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