Racial Disparities in Orthodontic Care for Medicaid-Enrolled Children in Washington

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Abstract

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Introduction: This study assesses the relationship between race and orthodontic care utilization for children in the Washington State Medicaid Program.

Methods: This cross-sectional study focused on 570,364 Medicaid-enrolled children ages 6 to 19 years in 2012. The main predictor variable was race (White versus non-White). The outcome variable was orthodontic care use, defined using claims data as children who were pre-authorized for orthodontic treatment by Medicaid, received orthodontic records, and subsequently initiated orthodontic treatment. Logistic regression models were used to test our study hypothesis that non-Whites would be less likely to utilize orthodontic care than Whites. We also explored potential mediators of the relationship between race and orthodontic care use.

Results: Of the Medicaid-enrolled children, 8,223 were approved by Medicaid for orthodontic treatment and 7,313 initiated orthodontic treatment. Non-Whites were significantly more likely to utilize orthodontic care than Whites (OR: 1.18; 95% CI 1.02, 1.36; p =.031). Ethnicity mediated the relationship between race and orthodontic care utilization, whereby Hispanic non-White children were more likely to utilize orthodontic care than non-Hispanic White children (OR: 1.42; 95% CI: 1.18,1.70; p < .001).

Conclusion: Contrary to our original hypothesis, our data suggest that non-White children in the Washington Medicaid program were significantly more likely to utilize orthodontic care than non-Whites. Based on the characteristics of the Washington State Medicaid Program in 2012, Washington state policy may demonstrate a model for eliminating racial disparities in orthodontic care utilization for Medicaid-enrolled children. Future research should continue to monitor use of orthodontic care for racial and ethnic minorities in Medicaid.

Introduction

Prevalence of Racial and Ethnic Minority Children in the US

In the United States, racial and ethnic minorities comprise a significant portion of the total population. According to the Centers for Disease Control and Prevention, racial and ethnic minority populations are defined as Asian Americans, Black or African Americans, Hispanic or Latinos, Native Hawaiian or Pacific Islanders, and American Indians and Alaska Natives.[1] All other groups are considered to be a part of the majority population.[1] Based on 2011 U.S. Census Bureau data for all Americans, non-Hispanic Whites comprise 63.4% of the population.[2] The remaining 36.6% consist of racial and ethnic minorities, including 16.7% of whom are Hispanic or Latino, 13.1% are Black or African American, 5% are Asian, 1.2% are American Indian or Alaska Native, and <1% are Native Hawaiian or Pacific Islander.[2] Racial and ethnic minority populations will continue to grow, especially the Hispanic population. Hispanics are both the largest minority and immigrant group in the United States contributing significantly to the population growth of the entire nation.[3]

Racial and Ethnic Health Disparities

As the U.S. population undergoes demographic changes in racial and ethnic composition, it is unlikely that health disparities will be eliminated without concerted efforts from the public health community. A study based on U.S. children from 2003 and 2007 examined trends in racial and ethnic oral and systemic health disparities and identified newly emerging and worsening disparities.[4] For Latinos, no new disparities were identified and three disparities were eliminated: "no specialty care in past year", "no physician visit in past year", and "no routine dental visit in past year".[4] Also for Latinos, disparities in "teeth condition" and "sporadic insurance" worsened, while the "health status" disparity improved. For African Americans,

three new disparities were identified: “digestive allergies”, “uninsured”, and “problems getting specialty care”.[4] Eliminated disparities for African Americans were: “speech problem”, “no physician visit in past year”, “no routine preventive dental visit in past year”, and “did not receive all needed dental care in past year”.[4] Eliminating racial and ethnic disparities in oral health is an important step toward achieving social justice.[5]

Racial Disparities in Dental Care Use

Studies on Medicaid dental utilization rates reveal disparities that affect racial and ethnic minorities, but relatively fewer studied have been conducted on orthodontic care utilization.[6] Based on data from the 2007 National Survey of Children’s Health (NSCH), 15% of non-Hispanic White children did not have a preventive dental visit within the previous year, 24% of Hispanic children and 18% of Black children did not have a visit.[7] Based on the same data, 8.8% of White children were rated by their parent as having fair or poor oral health, but 20.4% of Hispanic Children and nearly 10% of Black children were rated by their parents as having fair or poor oral health.[7] In another study focusing on privately insured children in Milwaukee, WI, it was found that Black and Hispanic children had significantly fewer preventive dental procedures than White children.[8] After adjusting for household income, Black children were still less likely to receive most dental procedures compared to whites.[8] These findings parallel studies focusing on Medicaid populations. In Iowa, African American children make up a disproportionately greater number of the children with Medicaid insurance and the African American population has the highest proportion of children with dental insurance; however, African Americans have significantly lower odds ratios compared with White children to have a dental check-up.[9]

Malocclusion in Racial and Ethnic Minorities

In 1998, Proffit et al. analyzed data from the National Health and Nutrition Examination Survey (NHANES) III assessment to assess the prevalence of malocclusion and orthodontic treatment need in the United States.[10] Based on a study population comprised of 7000 children and adults and the Index of Orthodontic Treatment Need (IOTN), a tool used to assess need for orthodontic treatment, it was found that racial and ethnic minorities tended to have greater orthodontic treatment need compared to Whites.[10] An overjet >2mm was considered to be indicative of a class II malocclusion. Whites, Blacks and Mexican Americans had a varying prevalence of 57.6%, 64.4%, and 66.4% respectively for >2mm overjet.[10] Class III malocclusion was defined as an overjet less than or equal to 0 millimeters. Whites, Blacks, and Mexican Americans had varying prevalence of class III malocclusion of 4.9%, 8.1%, and 8.3% respectively.[10] These data indicate class II and class III malocclusions are more prevalent in Blacks and Mexican Americans.

Racial Disparities in Orthodontic Use for Children

In contrast to the previously mentioned racial disparities in malocclusion, more than 30% of White teenagers reported receiving orthodontic treatment, which was three times the rate for Mexican Americans and four times the rate for Blacks who reported receiving orthodontic treatment.[10] In another study based on Medical Expenditure Panel Survey (MEPS) data, Whites accounted for only 59.9% of population, yet disproportionately accounted for 77.1% of individuals who received orthodontic treatment. Similar to the observations regarding general dental care, after adjusting for income, Blacks and Hispanics were still less likely to have received orthodontic treatment compared to Whites.[11] Using survey data from over 2800 American high school sophomores in Ohio, a study published in 2004 found that orthodontic

utilization for Whites, Mexican Americans, and African Americans was 31%, 11%, and 8% respectively and that in schools located in suburban, affluent areas utilization was greater than 50%. In contrast, utilization was less than 10% for inner city high schools, which tend to consist disproportionately of minority students and those from lower socioeconomic status groups.[12]

In 2002 and 2003, nearly one-half million children in North Carolina were eligible for dental care under Medicaid. Less than 0.5% of these children received orthodontic care even though handicapping occlusion prevalence rates are 29% in adolescents and 14.2% in children.[13] In Washington State, in 1999 more than one-half million children were eligible for dental treatment under Medicaid coverage and less than 1% received orthodontic treatment.[14] In 1967, soon after the establishment of Title XIX, the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program was promulgated, which mandates orthodontic treatment for handicapping malocclusion for Medicaid-enrolled children up to the age of 21.[15] Based on the limited data from North Carolina and Washington State, the goals of the federal EPSDT program are far from being met.

To our knowledge, no studies have used state-level Medicaid data to examine racial and ethnic disparities in orthodontic care utilization for child enrollees. In our study, we hypothesize that among Medicaid-enrolled children, non-Whites are less likely to utilize orthodontic care than Whites. Also, we hypothesize that individual-level variables like ethnicity will influence the relationship between race and orthodontic utilization. This study is the first step in assessing the extent to which racial and ethnic disparities in orthodontic care exist within state dental Medicaid programs.

Materials and Methods

Washington Medicaid Program

In Washington state, there are approximately 1.6 million 0-17 year olds and 39% are non-White.[16] In comparison, 59% of child Medicaid enrollees in Washington are non-White.[16] The Handicapping Labiolingual Deviation Index (HLD) is currently used as a screening tool that provides diagnostic information about anterior overjet, overbite, ectopic eruption, crowding, buccal overjet, and labiolingual spread.[17] A total HLD score is calculated based on these HLD components and is used to identify potential candidates for approval of state funded orthodontic treatment. Once a potential candidate is identified by an orthodontic care provider, an application is submitted to the state approval committee. Following approval, orthodontic records are obtained, followed by treatment initiation; the orthodontic provider files claims at the appropriate intervals to get reimbursed for treatment. An example of reimbursement rates, effective January 2012, is as follows: $276.75 for orthodontic records, $1,836.18 for orthodontic treatment initiation, and $308.46 for each additional 3 months of active treatment.[18]

Data

Medicaid enrollment and claims data were requested from the Washington State Department of Social and Health Services (DSHS) Research and Data Analysis Division's Integrated Client Database (ICDB). The enrollment files include demographic information (e.g., child's date of birth, race, ethnicity) and the specific months during 2012 in which the child was enrolled in Medicaid. The claims data include information on dental care received by the child that was identified using the American Dental Association's Current Dental Terminology (CDT)

codes. A unique identifier was used to link each child's enrollment and claims data. The study was approved by Washington State Institutional Review Board.

Study Population

This study focuses on children ages 6-19 years enrolled in the Washington Medicaid Program from January 1, 2012 to December 31, 2012. This age range takes into consideration the ages at which orthodontic services are provided to children .[18] To be included in the study, the child must have had a CDT code of D8660 between January 1, 2012 and September 30, 2012 indicating a claim for orthodontic records.

Study Variables

Predictor Variable. The main predictor of the study was child's race, as reported by the child's primary caregiver. Children were classified as White or non-White (Black, Asian, American Indian, Alaskan Native, Hawaiian, Pacific Islander, multiple race, other).

Outcome Variable. The outcome variable was orthodontic care utilization. A code of D8660, representing a claim submitted by a provider for orthodontic records between January 2012 and September 30, 2012, served as the baseline period. This 9-month window was selected to allow for reasonable time for the patient to subsequently initiate orthodontic treatment after obtaining records. Codes of D8010-D8080 represented initiation of orthodontic treatment.[19] Children with a code of D8660 followed by a code D8010-D8080 were classified as having utilized orthodontic care.

Other Variables. We also explored three potential modifiers of race: Hispanic ethnicity (caregiver reported as Hispanic or non-Hispanic), age (<12 years or ≥12 years, calculated as of December 31, 2012), and history of regular dental care use (no/yes). Children with any of the following CDT codes present in 2012 were classified as having had a history of regular dental

care use: D1110-1120 (dental prophylaxis), D1206 or 1208 (topical fluoride treatment), D1330 (oral hygiene instructions), or D1351 (sealant application).

Statistical Analysis

Descriptive statistics (means, standard deviations, counts, and percentages) were calculated for variables of interest including age, race, and history of regular dental care. Logistic regression models were used to estimate odds ratios and corresponding 95% confidence intervals (α=0.05). To identify effect modifiers, we included interaction terms in separate regression models between race and the following variables: ethnicity, age, and history of regular dental care use. Data were analyzed using Stata 13 for Windows.

Results

Descriptive Statistics

A total of 899,088 children were enrolled in the Medicaid program for at least one month in 2012. After excluding children under age 6 and those older than age 19, there were 570,364 children remaining with an average age of 12.7 (SD, 4.1) years (Figure 1). Of these 570,364 children, 46.4% were ages 6 to 11 years and the remaining 53.6% were age 12 to 19 years. In terms of gender, 49.94% were female and 50.06% were male (Table 1). About 48% were White and 24.1% were of Hispanic ethnicity. In regards to dental care, 53.0% had a history of regular dental care during the study period.

Orthodontic Care Utilization

Of the 570,364 children, 1.44% (n=8,223) obtained orthodontic records and 1.28% (n = 7,313) utilized orthodontic care from January 1, 2012 to September 30, 2012. Among children who utilized orthodontic care, 38.9% (n = 2,844) were White and 52.4% (n = 3,834) were non-White (Table 2). Of the 910 children who obtained records but did not initiate orthodontic treatment, 40.2% (n = 366) were White and 46.0% (n = 419) were non-White. Racial data was missing for 635 of the children that utilized orthodontic care and 125 of children who obtained records but did not initiate orthodontic treatment.

Logistic Regression Models

Non-White children were significantly more likely to utilize orthodontic care than White children (OR: 1.18; 95% CI 1.02, 1.36; p =.031). Ethnicity mediated the relationship between race and orthodontic care utilization (p = 0.037). Compared to non-Hispanic White children, there were no significant differences in orthodontic use for non-Hispanic non-White (OR: 0.92; 95% CI 0.75, 1.14; p =.448) and Hispanic White children (OR: 0.95; 95% CI 0.65, 1.41; p =.816). However, Hispanic non-White children were significantly more likely than non-Hispanic White children to utilize orthodontic care (OR: 1.42; 95% CI 1.18, 1.70; p <.001). Child's age and history of regular dental care did not modify the association between race and orthodontic care use.

Discussion

Main Findings

Contrary to our original hypothesis, we found that Medicaid-enrolled non-White children were significantly more likely to utilize orthodontic care than Whites. We also found that

ethnicity modified the effect of race on orthodontic care use, whereby Hispanic non-White children were significantly more likely to use orthodontic care than non-Hispanic White children. Broadly, these findings suggest that minority children in the Washington Medicaid dental program do not experience disparities in orthodontic dental care use. In fact, minority children are more likely to utilize orthodontic care, which corresponds with greater levels of orthodontic need among minorities as previously reported.[10]

Our main finding that non-White children were more likely to use orthodontic care than White children is inconsistent with other studies in the orthodontic literature, which found that minorities were significantly less likely to use orthodontic care despite greater levels of need. [10, 12] One possible explanation for our finding was the relatively high reimbursement rate for orthodontic treatment in the Washington Medicaid program. In fact, the 2012 Medicaid reimbursement rates for orthodontic care in Washington were comparable to reimbursement rates for private dental insurance plans. Low reimbursements rates are one of common reasons dentists do not treat Medicaid patients, which is consistent with observational work indicating a positive relationship between Medicaid reimbursement rates and dental utilization rates for children.[20] Higher Medicaid reimbursement rates may have increased both utilization of orthodontic care and access to care for minority children.

We also found that Hispanic ethnicity modified the relationship between race and orthodontic use for children in Medicaid whereas child's age and history of regular dental care use did not. Because this is the first study to examine modifiers of race, there are no studies to which we can compare our findings. However, these findings suggest differential use of orthodontic care based on race and ethnicity, which underscore the importance of running

models with interaction terms to identify subgroups of children who may exhibit different patterns of dental care use as done in previous work.[21]

Policy and Research Significance of Study Findings

The findings from our study suggest that, for the given study period, there were no measurable racial disparities in orthodontic care use for children in the Washington state Medicaid program. We believe the driving force is reimbursement rates for orthodontic treatment that exceeded the national average during the study time period.[22] Higher reimbursement for orthodontic providers increases motivation to provide services. This underscores the importance of state policymakers establishing and maintain reimbursement rates that are considered reasonable by market standards, which is a possible way to reduce disparities in dental care use for minority children in Medicaid. In addition, 85.2% of the children utilizing orthodontic care had a history of regular dental care (compared to 53.0% of all children in the study), which reveals a potential referral mechanism by which children gain access to orthodontic care. This finding highlights the importance of ensuring that all children in Medicaid have access to primary dental care services to enable eligible children to obtain needed orthodontic care. Finally, of the 514 providers in the study sample who were orthodontic care providers, 42.4% were not orthodontists. This suggests that non-orthodontists, likely general dentists and pediatric dentists, provide a substantial amount of orthodontic care to Medicaid-enrolled children. Pre-doctoral dental school curricula may need to include additional clinical experiences for students planning to practice as general dentists in areas of high dental care need.

Future research should further investigate the factors related to orthodontic care use. Knowing that Hispanic ethnicity modifies the effect of race on orthodontic utilization in Washington, it may be of interest to examine this group in search of explanations for this effect.

Also, another possible avenue is to survey orthodontic providers who treat minority children in Medicaid to identify facilitators to participation in Medicaid beyond higher reimbursement rates. Yet another possible line of research is to interview parents of minority children in Medicaid to examine additional barriers related to use. Similarly, it may be beneficial to interview parents of children in Medicaid utilizing orthodontic treatment to determine how to increase orthodontic utilization for all Medicaid patients.

Strengths and Limitations

This study is the first to assess minority orthodontic care utilization disparities within a pediatric Medicaid population. In addition, our study is unique in that we define orthodontic care utilization with CDT codes using a two-step protocol consistent with the way in which orthodontic treatment is provided.

There are 3 main limitations. The first, we did not have information on treatment need. Having diagnostic data on orthodontic treatment needs would allow for a more complete analysis of racial and ethnic disparities in orthodontic use. The second, we assume that all providers appropriately billed Medicaid for orthodontic care, which may or may not be the case based on anecdotal evidence that some dentists provide treatment for Medicaid patients but do not bill the program because of administrative burden. Third, no information regarding treatment completion is available in claims data. In other words, our data show that non-White children in Medicaid were more likely to initiate orthodontic care than White children, but we do not know if they complete treatment at similar rates.

Conclusions

Based on the study, we conclude the following

- Medicaid-enrolled minority non-White children were significantly more likely to utilize orthodontic care than White children.
- Ethnicity influences the relationship between race and use of orthodontic care.

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Figure 1: Flow Chart for Study Sample

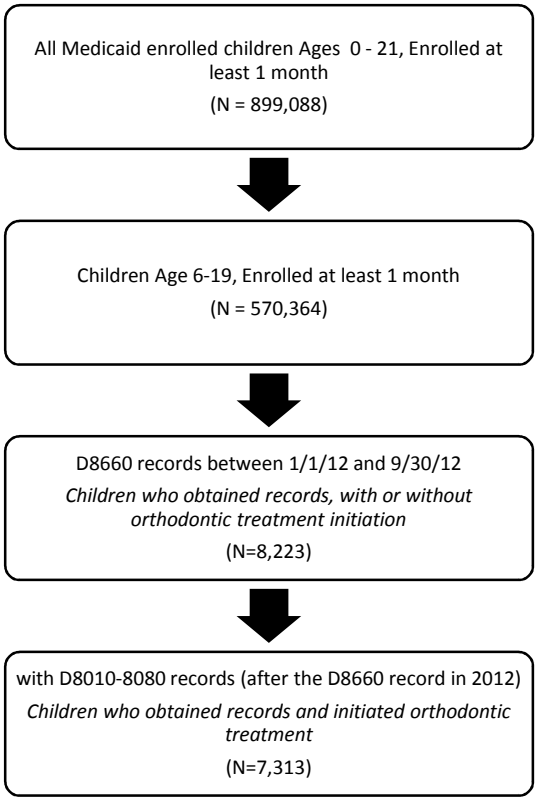

Table I : Demographic Characteristics of Washington Medicaid-Enrolled Children Age 6 to 19 years.

	Total Sample (N = 570,364)
	N (%)
Age	
6 to 11 years	264,756 (46.4%)
12 to 19 years	305,608 (53.6%)
Gender	
Female	284,815 (49.94%)
Male	285,541 (50.06%)
Race	
White	272,038 (47.7%)
Black	33,526 (5.9%)
Asian	17,862 (3.1%)
American Indian	16,553 (2.9%)
Alaskan Native	262 (0.1%)
Hawaiian	1,500 (0.3%)
Pacific Islander	11,638 (2.0%)
Other	144,049 (25.2%)
Not Provided	72,699 (12.7%)
Missing	237 (0.1%)
Hispanic Ethnicity	
Yes	137,447 (24.1%)
No	340,167 (59.6%)

Missing	92,750 (16.3%)
History of Regular Dental Care	
Yes	302,171 (53.0%)
No	24,356 (4.3%)
Missing	243,837 (42.7%)

Table II: Participant Characteristics by Orthodontic Treatment Status in Washington Medicaid Program in 2012

	Children who obtained records and initiated orthodontic treatment (N = 7313)	Children who obtained records but did not initiate orthodontic treatment (N = 910)	Children who obtained records, with or without orthodontic treatment initiation (N = 8223)
	mean (sd)	mean (sd)	mean (sd)
Age (years)	13.6 (2.6)	13.3 (3.0)	13.6 (2.7)
	N (%)	N (%)	N (%)
Age			
Less than 12 years	1985 (27.1%)	319 (35.0%)	2304 (28.0%)
12 years or older	5328 (72.9%)	591 (65.0%)	5919 (72.0%)
Race			
White	2844 (38.9%)	366 (40.2%)	3210 (39.0%)
Black	365 (5.0%)	56 (6.2%)	421 (5.1%)
Asian	213 (2.9%)	30 (3.3%)	243 (3.0%)
American Indian	153 (2.1%)	25 (2.8%)	178 (2.2%)
Alaskan Native	6 (0.1%)	0 (0%)	6 (0.1%)
Hawaiian	7 (0.1%)	1 (0.1%)	8 (0.1%)
Pacific Islander	81 (1.1%)	19 (2.1%)	100 (1.2%)

Other	3009 (41.1%)	288 (31.6%)	3297 (40.1%)
Not Provided	635 (8.7%)	125 (13.7%)	760 (9.2%)
Hispanic Ethnicity			
Yes	2791 (38.2%)	287 (31.5%)	3078 (37.4%)
No	3640 (49.8%)	503 (55.3%)	4143 (50.4%)
Missing	882 (12.0%)	120 (13.2%)	1002 (12.2%)
History of Regular Dental Care			
Yes	6301 (86.2%)	775 (85.2%)	7076 (86.0%)
No	1012 (13.8%)	135 (14.8%)	1147 (14.0%)

Table III: Association between Race and Orthodontic Care Utilization & Effect Modification of Variables of Interest on the Association between Race and Any Orthodontic Treatment using Logistic Regression Models

	Odds Ratio (95% CI*)	p-value
Unadjusted Models		
Race		0.031
White	reference	
Other	1.18 (1.02, 1.36)	
Interactions with Race		
Interaction between Race and Age	1.19 (0.86, 1.63)	0.285
Interaction between Race and Regular Dental Care	0.99 (0.65, 1.50)	0.965
Interaction between Race and Hispanic Ethnicity	1.61 (1.03, 2.51)	0.037
Interactions with Hispanic Ethnicity		
Interaction between Hispanic Ethnicity and Age	1.11 (0.80, 1.54)	0.518
Interaction between Hispanic Ethnicity and Regular Dental Care	1.21 (0.77, 1.91)	0.409

*CI = Confidence

Table IV: Effect Modification of Hispanic Ethnicity on the Association between Race and Any Orthodontic Treatment using Logistic Regression

	Odds Ratio (95% CI*)	p-value
Interaction between with Race and Hispanic Ethnicity		0.037
White and Non-Hispanic	Reference	
Non-White and Hispanic	1.42 (1.18, 1.70)	<0.001
White and Hispanic	0.95 (0.65,1.41)	0.816
Non-White and Non-Hispanic	0.92 (0.75, 1.14)	0.448

*CI = Confidence