COMPLIANCE AND EFFICACY OF ORTHODONTIC MEDICAID IN SOUTHERN NEVADA: A RETROSPECTIVE STUDY

By

Troy McCartney

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Troy McCartney

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Christina Demopoulos, D.D.S.
Examination Committee Chair

Karl Kingsley, Ph.D.
Examination Committee Member

Charles Hill, D.M.D.
Examination Committee Member

Courtney Coughenour, Ph.D.
Graduate College Faculty Representative

Alyssa Crittenden, Ph.D.
Vice Provost for Graduate Education & Dean of the Graduate College

Abstract

Compliance and Efficacy of Orthodontic Medicaid in Southern Nevada: A Retrospective Study

By

Troy McCartney, DMD

Dr. Christina Demopoulos, Examination Committee Chair
Professor of Biomedical Sciences
University of Nevada, Las Vegas
School of Dental Medicine

Objective: The study's main objective is to evaluate efficacy and compliance in Medicaid orthodontic patients compared to private insurance and cash (self-pay) patients in Southern Nevada. In addition, the paper will study the trends in approval selection such gender, age, race/ethnicity, and case type. This information will be used to discuss the barriers that Medicaid patients face and offer solutions for the issues found in the orthodontic Medicaid system.

Introduction: Medicaid coverage was brought forward by the Federal Social Security Act in July of 1965. Since then, there have been many discussions on how orthodontic treatment should be covered under the Medicaid umbrella. With the states having the ability to determine allocation of resources, reimbursement, and qualifications, there tends to be great confusion around the system from state to state. Medicaid patients and providers also face many other barriers to treatment, including the preconceived notions of treatment inefficiency and lack of patient

compliance. There have been studies done in states such as North Carolina, Iowa, Illinois, Washington, and Texas to analyze the state orthodontic Medicaid, but no similar studies have been conducted in Nevada. With 938,519 Medicaid enrollees in Nevada, or 1 in 4 people, it is important to understand this population to help educate both providers and patients in order to better the system as a whole.

Methods: A retrospective study was completed by analyzing data from the electronic health record (EHR) system [axiUm] from UNLV School of Dental Medicine over a 3-year period from 3/1/2016-3/1/2019. The information collected was used to compare efficacy and compliance of orthodontic Medicaid vs orthodontic non-Medicaid patients based on grading criteria of treatment time, broken appointments, emergency appointments, and compliance.

Results: Overall, there were 342 patients in the study consisting of 122 Medicaid and 220 non-Medicaid patients. Medicaid patients averaged longer treatment time, 31.5 months vs 28.5 months, and more appointments, 27.4 vs 24.2. However, this was expected as it was found that the Medicaid approval process leads to more complex cases as a group. In terms of grading criteria, there was no statistical significance found to make definite conclusions in any of the four criteria of compliance and efficacy. Medicaid patients finished over treatment time more often, 53% vs 46%, and had a higher percentage of recurrent compliance notes, 53% to 46%, than non-Medicaid patients. Inversely, Medicaid patients had a smaller percentage of patients with a "high risk" broken appointment rate, 27% vs 35%, and a smaller percentage of patients that had more than 1 emergency appointment, 30% vs 36%, than the non-Medicaid group.

Discussion and Conclusions: The study did not find any statistically significant evidence to say that Medicaid patients differ from non-Medicaid patients in compliance or efficacy in Southern Nevada. The Medicaid patient faces great barriers in the access to orthodontic care, but many preconceptions of the patient are misguided. The onus of the extremely low utilization rate falls on the system, and there is still great importance in the effort to help serve this large and growing population more effectively.

Key words: Medicaid, Orthodontics, Nevada, Compliance

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Chapter 1:

Introduction

Background

Medicaid insurance was brought forward in the Federal Social Security Act in July of 1965 [1]. Title XIX of this Social Security Act provided dental benefits, including dental services to those medically indigent regardless of one's age. The American Dental Association (ADA) recognized that severe malocclusions were detrimental to health and had a task force investigate national health programs for children, recommending priority for "interceptive service for disfiguring or handicapping malocclusions" [2]. Handicapping malocclusions were stated as a malocclusion, including craniofacial abnormalities/anomalies, which compromise the patient's physical, emotional, or dental health [3]. The conversation then became what malocclusions should be the ones distinguished as priority and requiring treatment. While several indexes, such as Handicapping Labio-Lingual Deviations Form (HLD), were created in an attempt to better outline "handicapping malocclusions", there is still an unclear definition due to the subjectivity of the classifications [4]. More so, since Medicaid is unique in that is financed in part by the federal government and in part by the state government, significant variation has been introduced in how the program is operates from state to state [5]. Each individual state has the ability to determine the allocation of resources, reimbursement, and qualifications that categorize a "handicapping malocclusion" [1]. For one example of the degree of variance, in 2007 state's reimbursements ranged from as low as $775 to a high of $5530, with an average of only 63% of the private-practice normal fee [1].

Not only does Medicaid vary depending on the state, the statewide policies tend to change over the years making it extremely difficult for providers to have a full grasp of what falls under the Medicaid umbrella. Much of this confusion comes at the expense of the Medicaid patients, as many providers find it too troublesome to wade through the information and end up deciding to not accept Medicaid coverage at all. This all leads to a serious problem - as the number of individuals enrolled in Medicaid continues to climb, the provider participation in Medicaid continues to fall [5,6]. Even more unfavorable is the fact that the majority of the increase in enrollees have been children under the age of 21 [7]. The sparsity of providers can be so extreme that in the states of Washington and North Carolina, only 10% of orthodontist provide over 80% of the orthodontic treatment to Medicaid qualifying patients [8,9]. Additionally, less than 10% of North Carolina Medicaid providers submitted claims for at least 10 Medicaid patients during a 3-month period during 2005 [10].

Often, many people will blame the discrepancies above on some preconceived notions such as inconsistent trends in acceptance, compliance issues, broken appointments, and low reimbursement rates [6]. Some of the published literature has looked into the qualifying trends, and as a whole, studies have found great subjectivity and lack of consistency in the approval tendencies across states [1]. A poll in North Carolina questioned 166 orthodontist and found 93 of them never accepted Medicaid [8]. Out of the 93 who never accepted Medicaid, only 4 responded “getting authorization” was not part of the problem [8]. This goes further as in Oklahoma, a study suggested race, family income, education level, and access to regular source of care have an effect on who is more likely to have orthodontic treatment [4]. The study found trends in characteristics with the groups of females, 15-18 years of age, and Caucasian patients

having increased likelihood of Medicaid orthodontic care. One explanation is that the further divide in socioeconomic status could result in lower dental IQ, preventing people from realizing the benefits of dental and orthodontic need [4]. Again though, trends are not always consistent across states. In 2012, a study in Washington looked at 570,364 children enrolled in the Medicaid program and found 7,313 initiated orthodontic treatment. They found non-white children in the Washington state Medicaid program were significantly more likely to utilize orthodontic dental care services than white children. Out of the 7,313 who initiated orthodontic treatment, 52.4% were non-white and 38.9% were white, compared to 48% of children enrolled in the Medicaid system being white [11].

After the qualifying step, broken and failed appointments have always been at the center of the Medicaid discussion. A study conducted by over 20 practitioners in a hospital's dental clinic with 10,000 yearly patient visits, showed Medicaid patients as a "High Risk No Show" group, with a significant "no show" relationship in regard to minorities [12]. Another paper concluded that Medicaid patients show increase in broken appointments and poorer hygiene than the non-Medicaid orthodontic comparison [13]. These papers have their limitations though, and many have taken to their own research to disprove such notions [6]. If these patients are believed to be less compliant, more complex, and there is an additional list of requirements to get them approved, the barriers quickly become apparent [5,14].

With these difficulties in mind, other studies moved to look at how often orthodontic Medicaid benefits are successfully used by enrollees and found that the utilization rate of Medicaid orthodontic coverage is alarmingly low. In 2004, approximately 6 percent of US children and

adolescents insured through Medicaid received orthodontic care. In comparison, 17 percent of privately insured youth received orthodontic care [15]. Unfavorably, data estimates that 29% of adolescents and 14.2% of children have severe to very severe handicapping malocclusions [14]. It begs the question, does this reflect on the patients, providers, or the system? Rates of utilization also vary considerably by state to the extent that about 1% of Medicaid eligible children in Washington received orthodontic treatment and less than 0.5% of Medicaid eligible patients in North Carolina received orthodontic treatment [15]. In Iowa, a study found that from 2009-2010, there were 116,330 children and adolescents enrolled in the Iowa Medicaid program. During this time, the overall utilization rate for orthodontic treatment was 3.1%. More eye opening, less than 4% of patients that did utilize Medicaid orthodontic treatment were submitted and approved for interceptive (Phase I) treatment. That means that only 137 children out of the 116,330 children enrolled in Medicaid utilized coverage and received interceptive orthodontic treatment [14].

Such deviation from state to state can cloud this already complex issue. The state's variations in the process can include eligible providers, coverage by patient age, qualifying criteria, reviewers, required records, reimbursement methods to providers, acceptance rates, expenditures, and reimbursement rates [5]. While, several studies have been conducted in states such Oklahoma, Iowa, North Carolina, Illinois, Texas, and Washington to look into the disparities in orthodontic Medicaid treatment within their state, similar studies have not been conducted in Nevada. With the distinguished variances discussed above, the understanding of the system within a particular state holds great importance.

With each angle this issue is viewed, more questions arise. The lack of providers, negative preconceptions, low rate of utilization, and incomprehension to the system all formulate the true barriers to care that are evident in the orthodontic care of this population. This study will look to investigate the Medicaid system from an orthodontic point of view while evaluating efficacy and compliance in Medicaid orthodontic treatment compared to private insurance/cash orthodontic patients in Southern Nevada. The paper will study the trends in approval selection such as gender, age, race/ethnicity, and case type. These findings will be used to discuss the validity of these preconceptions, how to improve the Nevada Orthodontic Medicaid system for both patients and providers, and the barriers that patients face while applying behavioral economics to offer future solutions. If providers can have a better understanding of the system, they will be able to treat this large group of the population more effectively.

Nevada Background

Geographic information system mapping (GIS) published in 2021 revealed an uneven per capita distribution of dental providers, including general dentists and clinical specialists, between the 17 counties in the state of Nevada and the 55 zip codes of the Las Vegas Valley. A total of 49% of low-income adults and 40% of middle-income adults residing in Nevada considered themselves to have a level of fair or poor oral health [16]. Only 60% of adults and 75% of children less than 18 years old reported having visited a dentist or dental clinic the past year, with the reasons to not visit a dentist including financial difficulty (57%), fear of dentist (20%), trouble finding dentist (15%), and inconvenient location or time (11%) [17]. In 2018, there were 1,617 fully licensed general and clinical specialty practice dentists in Nevada, with a ratio of 56 dentists per 100,000 people – slightly below the national average of 61 dentists per 100,000 population. Out

of the 1,617 dentists, there were 119 orthodontists or 7% of the total licensed dental providers. There are 359 Medicaid accepting dental offices in the state, with all but 24 of them being in Clark County (279 of the 359), Washoe County, or Carson City [16]. In Nevada, individuals under the age of 21 who receive Medicaid are eligible to receive comprehensive dental care. Orthodontic treatment is covered when it is deemed "medically necessary."

Nevada Orthodontics

Nevada Medicaid has reached an enrollment record of 938,519 enrollees as of February 2023, which is 1 out of every 4 Nevadans [18]. Before this recent spike in enrollment, credited to the pandemic, the previous record was 690,596 in August of 2018. Depending on the year, anywhere from 44.2%-63.6% of enrollees are made up of children under 19 years old [18].

During a Nevada Medicaid meeting on February 11th, 2016, the focus was on revisions to clarify coverage and limitations regarding prior authorization of orthodontic treatment. The meeting described orthodontics as "the branch of dentistry used to correct malocclusions of the mouth and restore it to proper alignment" [19]. Nevada Medicaid authorizes payment for orthodontics for qualified recipients for patients under 21 years of age. Medicaid does not cover orthodontic treatment unless authorized by the Children with Special Health Care Needs or when authorized as medically necessary under EPSDT (early and periodic screening, diagnostic, and treatment). Only dentists with a specialty in orthodontists are allowed to bill for Medicaid orthodontic treatment, disqualifying general dentists. Patients can be denied if the referral report does not show a good history of patient keeping appointments and complying with dental care treatment. Orthodontists must submit requests that explain the significance of "medical need". The examples they list include functional factors such as impaired mastication and muscular

dysfunction, factors related to degree of deformity which produces psychological need (psychological need based on objective evidence and reviewed by dental consultant), recipients overall medical need based on his/her total medical condition, medical appropriateness of orthodontic treatment plan as opposed to other available dental treatment, and a score of 26 or higher on the HLD Index (handicapping labio-lingual deviation). In submitting claim forms, the orthodontist must submit examination notes, diagnostic casts, panoramic x-rays, and diagnostic films. They must also include an HLD Index report form, client treatment history form, and statement addressing the diagnosis, treatment plan, and prognosis. If approved, the provider enters the service date and acceptance of payment is considered his/ her agreement to prorate and forward payment to any orthodontist the recipient may select to complete orthodontic treatment. The orthodontist cannot assess the recipient for additional charges on broken bands or any other necessary services, even if the recipient's poor compliance or carelessness caused the need for additional services [19].

Chapter 2:

Methods and Materials

Sampling Search

A retrospective study was completed by analyzing data from the electronic health record (EHR) system [axiUm] from UNLV School of Dental Medicine over a 3-year period from 3/1/2016-3/1/2019. This period was selected because the updated orthodontic Medicaid rules went into effect in the middle of February of 2016. The information collected was used to compare orthodontic Medicaid vs orthodontic non-Medicaid patients based on estimated vs actual treatment time, failed/rescheduled appointments, emergency appointments, and patient's compliance/hygiene. Compliance and hygiene data was pulled from records in the patient's provider notes. In addition, other variables of interest that were collected included gender, age, race/ethnicity, and details on the case type including Angle classification, crowding, overjet (OJ), and overbite (OB).

Inclusion Criteria

The inclusion criteria for the targeted population included patients under the age of 18, treated at the UNLV orthodontic clinic, and that have started and completed fixed (bracket and wires) orthodontic treatment.

Exclusion Criteria

Exclusion criteria included patients that received phase I treatment, impacted teeth (excluding 3rd molars), and surgical cases. The study will consider treatment time as the first day beginning orthodontic appliances until the final debond date.

IRB Protocol

The protocol for this study titled "Compliance and Efficacy of Orthodontic Medicaid in Southern Nevada: A Retrospective Study" was reviewed by the UNLV Biomedical Institutional Research Board (IRB) (UNLV-2022-420) and approved on February 10, 2023.

Statistical Analysis

Data was first cleaned and re-coded for running analytical operations. Categorical variables were represented as frequencies and proportions, whereas continuous variables were represented by mean and standard deviations. A chi-square was conducted to compare categorical variables. A post-hoc contingency table analysis using adjusted residuals (or Z scores) was performed in case of multiple comparisons. All statistical assumptions were assessed, including the normality assumption. Levene's test was conducted to assess homogeneity of variance assumption. Independent-sample-t-test was conducted to compare the continuous outcomes across groups. All analyses were conducted using the Statistical Package for Social Sciences for Windows (SPSS) version 27 (IBM Corp. Armonk, NY, USA). All analyses were conducted at $\alpha = 0.05$. All p values were two-sided.

The statistical analysis evaluated the two groups based on four criteria- treatment time, broken appointments, failed appointments, and compliance/hygiene notes. More so, the study provided a chart showing the trends found in the approval selection.

The treatment time criteria was evaluated if the patients went over proposed treatment time by reviewing estimated treatment time given in the patient's signed treatment plan vs the actual amount of the time that the patient was in treatment. Patients that completed treatment on time or under proposed treatment time were counted vs the patients that completed treatment longer than the proposed treatment time.

For the broken appointments criteria, the study looked at the number of failed or rescheduled appointments throughout the duration of treatment. This number was divided by the number of total appointments scheduled, both completed appointments and broken appointments added together, to find the percent of appointments broken per total number of appointments scheduled. The study used the value of >20% of scheduled appointments broken to categorize high risk failure rate patients [6].

In terms of emergency appointments, the study looked at the number of emergency appointments by patients throughout the duration of treatment. The study differentiated into the two groups of >1 emergency appointment throughout treatment, and </= 1 emergency appointment throughout treatment [20].

Finally, the last criteria evaluated was the compliance and hygiene notes made by the provider. The notes were reviewed in the patient's electronic health record (EHR). If multiple (2+) notes were made in terms of compliance or hygiene, including elastics wear, appliance instructions, broken brackets, or insufficient oral hygiene, the patient was included in the "yes" compliance/hygiene notes section [20]. If 2+ notes were not made by the provider in the notes section of the EHR throughout the duration of treatment, they were included in the "no" category of the compliance/hygiene section.

Case Study

The case study data was pulled from the "Ortho 3 treatment plan and diagnosis form" in the patient's EHR. Each patient has a comprehensive diagnosis and descriptive treatment plan completed by the treating resident and approved by the orthodontic faculty.

Occlusion Classification was graded based on the "Angle Classification of Malocclusion". The three categories used were Class 1, Class II, and Class III, which are determined on molar and canine relationship. The diagnosis was completed by treating resident [21]. Next, crowding was graded into three categories based off the resident's diagnosis. The three categories were mild (0-4mm), moderate (5-8mm), and severe (9+ mm of crowding) [21].Overjet was categorized based on discrepancy index (DI) scoring of the American Board of Orthodontics (ABO). If >5 mm OJ (1 standard deviation above), overjet was categorized as excessive. If <0 mm OJ (1 standard deviation below), overjet was categorized as negative [22]. Lastly, overbite was also categorized based on discrepancy index scoring of ABO cases. If >5 mm OB (1 standard deviation above),

overbite was categorized as deep. If <0 mm OB (1 standard deviation below), overbite was categorized as open [22].

Chapter 3:

Results

Demographic

The demographic data results can be seen in Table 1. The results analyzed 342 patients in total consisting of 122 Medicaid patients and 220 non-Medicaid patients that fit the criteria. The overall average age of the patient pool was 13.3 years and the two groups differed by 0.6 years, with Medicaid patients averaging 12.9 years of age and non-Medicaid patients averaging 13.5 years of age. Both groups showed more female patients than male patients with 54.9% female in Medicaid and 60.5% female in non-Medicaid. The Medicaid group was predominately Hispanic at 74.3%, while the non-Medicaid group had a larger white population at 42.2%, narrowly followed by Hispanic at 41.7%. Statistical analysis displayed significance in age and race, showing Medicaid patient in this study were younger and had a higher proportion of Hispanics.

Table 1: Social Demographic Characteristics of Study Population (N=342)

Variable name	Categories	Study Sample N=342	Medicaid n= 122 (35.7%)	Non- Medicaid n=220 (64.3%)	P value	Test statistics
Age in years (M±SD)	-	13.3±2.0	12.9±2.02	13.5±1.98	**0.018**	-2.384
Gender	Male	142 (41.5)	55 (45.1)	87 (39.5)	0.320	0.991
	Female	200 (58.5)	67 (54.9)	133 (60.5)		
Race/Ethnicity	White	93 (31.4)	14(12.8)	79 (42.2)	**<0.001**	34.01
	Hispanic	159 (53.7)	81 (74.3)	78 (41.7)		
	Asian	22 (7.4)	8 (7.3)	14 (7.5)		
	Black	24 (8.1)	6 (5.5)	18 (9.6)		
	Undisclosed	*46 (13.5)*	*13 (9.8)*	*33 (15.0)*		

P values<0.05 are significant and are bolded in the table; Some categories may not add up to 100% due to missing data, for example, 13.5% race/ethnicity data were missing. Data are presented as counts and proportions unless stated otherwise; M=Mean; SD=Standard Deviation

Treatment Course

Table 2 shows the treatment data of the groups. Medicaid patients had statistically significant mean scores of treatment time (31.5± 12.4 vs. 28.5 ± 11.3, p=0.026), and number of appointments (27.4 ±10.2 vs. 24.2 ± 9.4, p=0.004) as opposed to their non-Medicaid counterparts. When looking at treatment time vs estimated treatment time, 65 patients of the 122 Medicaid patients (53.3%) went over the expected treatment time, with the average treatment going over estimated time by 4.5 months. In comparison, 101 of the 220 non-Medicaid patients (45.9%) went over the expected treatment time, with the average treatment going over by 3.6 months.

Table 2 also shows the descriptive results of broken appointments, emergency appointments, and recurrent compliance/hygiene notes. Combined, the total group had a mean number of 5.5 broken appointments and a rate of 17.5% broken appointments per total scheduled. Medicaid patients had a mean number of 5.3 broken appointments throughout treatment, with an overall rate of 16.3% broken appointments per total scheduled. Non-Medicaid patients had mean number of 5.6 broken appointments, with an overall rate of 18.5% broken appointments per total scheduled.

With emergency appointments, the study sample had 1.3 emergency appointments during the course of treatment. Medicaid patients had a mean of 1.2 emergency appointments while non-Medicaid patients had a mean of 1.3 emergency appointments throughout the duration of treatment.

Finally, there was a group total of 167 out of 342 (48.9%) patients with recurrent compliance/ hygiene notes. Of the 122 Medicaid patients, 65 (53.2%) of patients had recurrent compliance/hygiene notes. Comparatively, non-Medicaid had 102 patients out of 220 (46.3%) with recurrent compliance/hygiene notes.

Table 2: Comparing treatment course among groups (N=342)

Variable name	Categories	Study Sample N=342	Medicaid n= 122 (35.7%)	Non- Medicaid n=220 (64.3%)	P value	Test statistics
Treatment time (Months)	Mean	29.6 ± 11.7	31.5± 12.4	28.5 ± 11.3	**0.026**	2.230
	Median	27	30	26.5		
Treatment time vs Estimated treatment time (months over)	Mean	3.9 ± 8.5	4.5 ± 9.5	3.6 ±7.8	0.351	0.934
Number of appointments	Mean	25.4±9.9	27.4 ±10.2	24.2 ± 9.4	**0.004**	2.895
Patients over treatment time	-	166 (48)	65(53.3)	101(45.9)		
Number of broken appointments	Mean	5.5 ± 3.6	5.3 ± 3.3	5.6 ± 3.7		
% of Broken appointments per total scheduled	Mean	17.7 ± 9.5	16.3 ± 8.8	18.5 ± 9.8		
Number of emergency appointments	Mean	1.3 ± 1.5	1.2 ± 1.5	1.3 ± 1.5		
Recurrent Compliance and Hygiene notes	-	167 (48.9)	65 (53.2)	102 (46.3)		

P values<0.05 are significant and are bolded in the table; Data are presented as mean and standard deviation unless stated otherwise. The bottom four categories were used as the grading criteria with statistical analysis shown on Table 3.

Grading Criteria

Table 3 shows the four grading criteria of the study. The grading criteria includes over/under treatment time, broken appointments, emergency appointments, and recurrent compliance/hygiene notes.

The Medicaid group had 65 patients (53%) finish over treatment time and 57 patients (43%) finish under or on time. The non-Medicaid group had 101 patients (46%) finish over treatment

time and 119 (54%) finish under or on time. The chi square test with a significance at $p<0.05$ showed a chi square value of 1.731 and p level of .191, meaning the difference is statistically insignificant.

The Medicaid group had 33 patients (27%) have a greater than 20% broken appointment rate and 89 patients (73%) have a less than 20% broken appointment rate. In comparison, the non-Medicaid group had 79 patients (35%) have a greater than 20% broken appointment rate and 141 patients (65%) have a less than 20% broken appointment rate. When looking at the chi square test with a significance at $p<0.05$, the numbers showed a chi square level of 2.797 and p level of 0.094, meaning the difference is statistically insignificant.

Next, the study looked at number of patients with >1 emergency appointments throughout treatment. The Medicaid group had 37 patients (30%) with >1 emergency appointment and 85 patients (70%) with </ = 1 emergency appointment. In comparison, non-Medicaid group had 80 patients (36%) with >1 emergency appointment and 140 patients (64%) with </ = 1 emergency appointment When looking at the chi square test with a significance at $p<0.05$, the numbers showed a chi square level of 1.27 and p level of 0.260, meaning the difference is statistically insignificant.

Lastly, the study looked at recurrent compliance and hygiene notes. The Medicaid group had 65 patients (53%) with 2+ compliance and hygiene notes and 57 patients (47%) with less than 2 compliance and hygiene notes. The non-Medicaid group had 102 patients (46%) with 2+ compliance and hygiene notes and 118 patients (54%) with less than 2 compliance and hygiene

notes When looking at the chi square test (table 2) with a significance at $p<0.05$, the numbers showed a chi square level of 1.50 and p level of 0.220, meaning the difference is statistically insignificant.

Table 3: Grading criteria (N=342)

Variable name	Categories	Medicaid n= 122 (35.75%)	Non- Medicaid n=220 (64.3%)	P value	Test statistics
Treatment time	Over	65 (53)	101 (46)	0.191	1.71
	Under/on time	57 (47)	119 (54)		
Broken Appointments	>20%	33 (27)	79 (35)	0.094	2.797
	<20%	89 (73)	141 (65)		
Emergency Appointments	>1	37 (30)	80 (36)	0.260	1.27
	</= 1	85 (70)	140 (64)		
Compliance/ Hygiene Notes	Yes 2+	65(53)	102 (46)	0.220	1.50
	No	57(47)	118 (54)		

Data are presented as counts and proportions unless stated otherwise

Case Study

Table 4 shows the types of cases in each group. A second objective of this manuscript was to evaluate the type of patients are usually accepted in the orthodontic Medicaid process compared to non-Medicaid patients in the clinic.

Looking at the Angle classification, the Medicaid group shows a majority of class II patients (55.7%), with an exact even split of the remaining cases between Class I and Class III. More so, this shows that 77.9% of the patients accepted for Medicaid and treated at UNLV were not considered to be Class I occlusion. In comparison, 71% of the non-Medicaid patients were classified into the Class II or Class III category.

When studying the crowding classification of the Medicaid group, 53 (43.4%) were classified as mild, 54 (44.3%) were classified as moderate, and 15 (12.3%) were classified as severe crowding. Overall, 56% of Medicaid patients accepted and treated at UNLV fell in the moderate or severe crowding classification. In non-Medicaid patients, 119 patients (54.1%) were classified as mild, 78 patients (35.5%) were classified as moderate, and 23 patients (10.5%) were classified as severe crowding. Overall, 46% of Medicaid patients accepted and treated at UNLV fell in the moderate or severe crowding classification.

Additionally, the study looked at the different vertical discrepancies of the patient's occlusion and found a statistically significant higher proportion of discrepancies in Medicaid patients. 13 Medicaid patients had open bites (10.6%) and 27 had deep bites (22.1%). Both of these percentages more than doubled in the non-Medicaid group of 4.1% and 10.5%, respectively.

Finally, the study analyzed the sagittal relationship of the patients in both groups and found a statistically significant higher proportion of discrepancies in Medicaid patients. The Medicaid group contained 38 patients (31.1%) with excess OJ (>5mm), and 8 patients (6.5%) with an under bite. The excess OJ percentage again doubled the non-Medicaid group of 35 patients (15.5%). While the 6.5% under bite percentage was slightly higher than the non-Medicaid group, which was found to be 9 patients (4.1%).

Table 4: Medicaid vs Non-Medicaid Case types (N=342)

Variable name	Categories	Medicaid n= 122	Non- Medicaid n=220	P value	Test statistic
Angle Occlusion Classification	Class I	27 (22.1)	62 (28.2)	0.33	2.237
	Class II	68 (55.7)	122 (55.5)		
	Class III	27 (22.1)	36 (16.4)		
Crowding	Mild	53 (43.4)	119 (54.1)	0.20	3.180
	Moderate	54 (44.3)	78 (35.5)		
	Severe	15 (12.2)	23 (10.5)		
Vertical Bite	Deep >5mm	27 (22.1)	23 (10.5)	**<0.001**	13.905
	Open	13 (10.6)	11 (4.1)		
Sagittal Bite	Excess OJ >5mm	38 (31.1)	34 (15.5)	**0.001**	13.639
	Negative OJ	8 (6.5)	9 (4.1)		

P values<0.05 are significant and are bolded in the table; Data are presented as counts and proportions unless stated otherwise

Treatment Time vs Compliance Notes

With the number of patients that went over treatment time, 48.5%, so similar to the number of patients with recurrent compliance or hygiene notes in both the Medicaid and non-Medicaid group, 48.9%, the paper looked to briefly examine if there were any deeper connection between the two. The results, displayed in Table 5, show that out of the 101 non-Medicaid patients that finished over treatment time, 64 of them (63.3%) had multiple compliance/hygiene notes in their charts. While the 119 non-Medicaid patients that finished on or under time, only 38 of them (31.9%) had recurrent compliance/hygiene notes in their charts. For non-Medicaid patients, it was more than double as likely for them to go over treatment when having compliance or hygiene issues.

This result slightly differed with Medicaid patients, where the compliance notes were more evenly spread through patients who finished over treatment time and on time. Out of the 65 Medicaid patients that went over treatment, 37 of them (56.9%) had multiple compliance notes.

In comparison, with the 57 Medicaid patients in the study that finished on time or under treatment time, 28 of them (49.1%) had recurrent compliance and hygiene notes. Patients finishing on or under time still had a lower % of compliance/hygiene notes as a whole, but not to the discrepancy of the non-Medicaid patients.

Table 5: Treatment time vs compliance/ hygiene notes

	Medicaid On or Under treatment time n=57	Medicaid Over treatment time n= 65	Non-Medicaid On or Under treatment time n=119	Non- Medicaid Over treatment time n=101
Recurrent Compliance/ Hygiene Notes	28 (49.1)	37 (56.9)	38 (31.9)	64 (63.3)

Chapter 4:

Discussion

Criteria Analysis

Medicaid patients did not show a statistically significant difference from non-Medicaid patients in any of our four grading criteria used to measure the total efficacy and compliance. While no statistically significant differences in the grading criteria, there were some noteworthy findings between the data.

Medicaid patients did show a statistically significant difference in total treatment time and total number of appointments. However, this was expected and why the study included over estimated treatment time instead of overall treatment time. Medicaid patients need to qualify for insurance coverage under "medically necessary", meaning more complex cases. Therefore, grading over the proposed treatment plan time mitigated the effect that the Medicaid qualifications had in the overall criteria. Medicaid patients averaged 31.5 months compared to non-Medicaid 28.5 months, which is about a 10.5% increase in time. More so, Medicaid patients need 27.4 appointments compared to 24.2 appointments for non-Medicaid patients, which is a 13.2% increase in appointments. In the North Carolina study, they found similar differences with a Medicaid average of 24.2 appointments and non-Medicaid average of 23.6 appointments [20]. While overall the total numbers are lower than our study, the difference between the two groups are similar.

Even with mitigating bias in the study on appointment time, Medicaid did still show slightly higher in number of patients going over treatment time. Medicaid patients outpace non-Medicaid patients, 53.3% to 45.9% of patients going over treatment, but not to a substantial enough margin where it was found to be statistically significant. Thus, disproving the notion that these cases are conclusively drawn out and continuously go longer than estimated.

Surprisingly, even with more total treatment time and total appointments, Medicaid patients actually averaged less broken appointments as a whole throughout the course of treatment. Medicaid averaged 5.3 broken appointments to non-Medicaid 5.6 broken appointments, which is a 5.6% increase in broken appointments for non-Medicaid. These numbers come in well under the study done in Illinois, where they found the average for university non-Medicaid failed appointments at 7.6 and university Medicaid patients at 10.3 [6].

Furthermore, this study's Medicaid patient pool had a 16.3% broken appointment rate per total compared to the 18.5% broken appointment rate of non-Medicaid. As stated prior, these numbers did not reach statistical significance to show any conclusive difference between the groups. This Medicaid failure rate was very similar to a study done in Virginia, where they found a 15.4% failure rate among their Medicaid orthodontic patients [13]. However, the non-Medicaid failure rate in our study of 18.4% was much higher than the 8.3% found in Virginia.

When it came to compliance/hygiene notes, Medicaid patients did again outpace non-Medicaid patients at a similar rate as patients over treatment time, at 53.2% to 46.3%. The numbers showing that a slightly higher percentage of Medicaid did have mentions of compliance and

hygiene issues during the orthodontic treatment. However yet again, these numbers did not fall into the statistically significant category to have a confirmed conclusion.

Lastly, the data with emergency appointments demonstrated slightly more emergency appointments with non-Medicaid patients. Medicaid patients averaged 1.2 emergency appointments and non-Medicaid patients average 1.3 emergency appointments, but again this difference did not reach statistical significance. These averages found in our study compared similarly to the North Carolina study averages which showed poor oral hygiene comments of 0.8 for non-Medicaid and 0.9 for Medicaid patients [20].

With all these results failing to reach statistical significance, the paper cannot state that Medicaid patients conclusively go over treatment more, break more appointments, have more compliance/hygiene issues compared to non-Medicaid patients, or have more emergency appointments.

Case Study

A secondary purpose of the study was to evaluate the population and case type of the Medicaid patients. The average age was 12.9 with a range of 9 to 18, with 54.9% female. The large majority of the group was Hispanic patients, making up 81 total patients or 74.3% of the patients. Patients were from 36 different zip codes across the extended Las Vegas Valley. As discussed in results, the cases showed to be more complex, with a higher prevalence of occlusion discrepancies with 78% Class II/ Class III vs 71% Class II/ Class III non-Medicaid; greater % of crowding cases with 56% moderate/ severe vs 46% moderate/ severe crowding non-Medicaid;

more deep bite with 22% vs 10% non-Medicaid; more open bite with 11% vs 4%; more excess overjet 31% vs 15% non-Medicaid; and more negative overjet with 7% vs 3% non-Medicaid. Overall, it was a well distributed group of patients with higher prevalence to Hispanic, class IIs, moderate or severe crowding, significant vertical discrepancies, and significant sagittal discrepancies.

Treatment Time vs Compliance Notes

The rates of over treatment time were so similar to the rates of compliance/hygiene notes that the paper sought to compare the findings. The study found that 63% of non-Medicaid patients that went over treatment had compliance/hygiene notes, which was more than double the 31.9% of non-Medicaid patients under treatment time that had compliance/hygiene notes. Comparatively, the Medicaid patient compliance/hygiene notes were more evenly distributed with a 56.9% to 49.1% spread. One possible trend to suggest from this is that compliance and hygiene played a bigger role in the treatment going over in the non-Medicaid group than the Medicaid group.

Final Hurdles & Solutions

So the thinking becomes, if there is no conclusive evidence that Medicaid patients finish treatment over time at a higher rate, break their appointments more often, have more emergencies, or have worse hygiene and compliance, there must be a reason that the number of Medicaid providers continue to decline and this group of the population continues to climb. The next and final step of this manuscript will be to analyze some of the additional hurdles that Medicaid patients face.

This study shows the onus is not the on the patient, it is on the system. Consequently, putting a grave importance on looking into this system for overall improvement as this population group continues to grow in Southern Nevada. As mentioned above, almost 1 in 4 Nevadans use Medicaid as their primary coverage in insurance [18]. Therefore, if there is no clear significant difference in efficacy and compliance in these Medicaid patients, there needs to be other variables studied to help strengthen this orthodontic availability of the Medicaid population.

Education

First to be addressed needs to be the education to providers about how the system works and the benefits of opening up to accepting the Medicaid patients. Studies like these show that the preconceived notions are not proven, and that there is no conclusive difference in the tendencies of these patients. However, not only do providers need to be educated, but the families also need to be educated on how to properly use their coverage for their children. They need to know what ages to visit, what clinics to go to, and what points of coverage are available to them to give their child the smile they deserve.

Reimbursement Rates

Secondly, the reimbursement rates need to be studied. As the amount of Medicaid enrollees has continued to increase, expenditures and reimbursement rates have decreased since 2006 [5]. States have tightened restrictions on qualifiers and increased submission requirements. Studies show that from 2006 to 2015, as overhead costs continue to grow, orthodontic Medicaid reimbursement dropped 28% on average from $2,944 in 2006 to $2,114 in 2015. In the Mountain region including NV, CO, ID, MT, NM, UT, and WY, the average reimbursement dropped 32%,

from $3,162 to $2,392. While the Medicaid reimbursement has dropped, the average private practice reimbursement has increased 11% from $4,670 in 2006 to $5,194 in 2015 [5].

When orthodontic Medicaid was first introduced in the 1960s, the orthodontic community was active in their role of certifying fair policies to both patient and practitioner [1]. In today's world, the ball has been dropped and compensation rates are all below regional averages nation-wide [1]. States officials now rely on generosity and good will of practitioners, but the professional desires have begun to yield at such a discrepancy in cost. One study showed US expenditure per US resident in 2000 was $8 for Medicaid dental care, $66 for physician Medicaid services, and $642 for all personal health Medicaid spending [23]. Dental Medicaid simply does not get the same financing as other health care fields. While providers are able to move on from the preconceived notions, they also must be properly compensated for their treatment.

Qualifications

Qualifications for Medicaid coverage have begun to gradually increase. This study shows that Medicaid cases have become tougher, due to the requirements, and thus take longer time. The combination of more complex cases and lower reimbursement rates place the burden heavily on the practitioner. If rates will not increase at the same rate as inflation, states need to open up qualifications to allow orthodontic care to children that are in need. While smile esthetics play such a big role into orthodontic treatment planning, the majority of states do not include any of this in this in their qualifying indexes [5].This inattention does not take into effect patient's psychological needs, and how much a smile can provide confidence to better promote children's

mental health. In a modern medicine world that understands the magnitude of mental health, the smile can provide true confidence to make a difference in children's lives

Utilization Rate

If you can improve the number of providers accepting Medicaid, the number of patients searching for treatment, have fair reimbursement, and have fair qualification, the low utilization rates seen, such as 1% in Washington, 0.5% in North Carolina, and 3.1% in Iowa, will without a doubt increase above the unacceptable levels it remains at now[8,14]. In increasing the utilization rate, the racial discrepancy of children who receive orthodontic treatment will decrease as well. Merit reported on how non-white patients use Medicaid at a higher rate than white counterparts in the state of Washington [11]. This study agrees with that sediment, where only 14 of the 122 Medicaid patients (11.2%) reported as white. In comparison to 81 of the 122 Medicaid (66.3%) patients reported as Hispanic. An improvement to the orthodontic Medicaid system, is also an improvement to racial disparity in each state.

Final Thoughts

There is no doubt that the system needs to improve. However, there is reason to believe that the failures in the system do not fall on the providers or the patients. The failures of the system fall directly on the system itself. The Medicaid system has made it tougher and tougher for the patients to qualify for treatment. This in turn means the patients that are covered fall into the more complex cases category and take an overall longer treatment time. With the reimbursement of these cases significantly lower than the industry average, it puts providers in a tough position even if the patients are just as compliant and reliable as a non-Medicaid patient. Children deserve

the right to have a healthy, functional, and esthetic smile, and the orthodontic Medicaid system needs to evolve in order to provide that for them.

Chapter 5:

Limitations of Study and Future Studies

The study had certain limitations that could not be excluded and are of importance to note. Being that the UNLV clinic is a residency program, different patients are seen by different providers throughout the course of treatment. While providers received the same level of training and are standardized in treatment diagnosis procedures and are overseen by consistent faculty, treatment time can vary depending on the provider. Since residents are only enrolled in the program for a 34-month period, it would be impossible to have a big enough patient pool to eliminate this variation and constrict the data to one single resident. Additionally, due to the study taking place in a single institutional setting with learning practitioners, there is limited generalizability and further studies across multiple Medicaid accepting practices should be conducted in the future.

Chapter 6:

Conclusion

There is no conclusive evidence to say that Medicaid patients differ from non-Medicaid patents in compliance or efficacy in Southern Nevada, with no statistically significant differentiation in any of the four criteria that were graded. However, the study did show conclusive evidence that Medicaid cases are more complex, take longer, and require more appointments. However, these findings are due to faults within the Medicaid system itself. In order to help provide this growing group of patients, many of which are minorities, more effectively, there needs to be a more active effort to remodel education, reimbursement, and qualifications.

Appendix A:

IRB Approval Letter

Biomedical - Expedited Review

Approval Notice

DATE: February 10, 2023

TO: Christina Demopoulos
FROM: Biomedical

PROTOCOL TITLE: UNLV-2022-420 Compliance and Efficacy of Orthodontic Medicaid in Southern Nevada: A Retrospective Study
SUBMISSION TYPE: Initial

ACTION: Approved
APPROVAL DATE: February 7, 2023
NEXT REPORT DUE: December 31, 2999
REVIEW TYPE: 5. Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

Thank you for submission of materials for this proposal. The Biomedical IRB has approved your study. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission. Only copies of the most recently submitted and approved/acknowledged Informed Consent materials may be used when obtaining consent.

This study has been determined to be minimal risk.
Waiver of HIPAA Authorization and Informed Consent has been approved for this study.

- Dates
- Medical Record numbers
- Any unique identifying number or code

PLEASE NOTE:
Should there be any change to the study, it will be necessary to submit a **Modification** for review. No changes may be made to the existing study until modifications have been approved/acknowledged.

All unanticipated problems involving risk to subjects or others, and/or serious and unexpected adverse events must be reported promptly to this office. All FDA and sponsor reporting requirements must also be followed where applicable.

Any non-compliance issues or complaints regarding this protocol must be reported promptly to this office.

All approvals from appropriate UNLV offices regarding this research must be obtained prior to initiation of this study (e.g., IBC, COI, Export Control, OSP, Radiation Safety, Clinical Trials Office, etc.).

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Curriculum Vitae

Graduate College

University of Nevada, Las Vegas

Troy McCartney

Email: mccart3@unlv.nevada.edu, troy575mc@gmail.com

Degrees:
Bachelor of Arts – Biology, 2017
University of Delaware, Newark, Delaware

Doctor of Dental Medicine, 2021
University of Pennsylvania, Philadelphia, Pennsylvania

Thesis Title:
Compliance and Efficacy of Orthodontic Medicaid in Southern Nevada: A Retrospective Study

Thesis Examination Committee:
Chairperson, Christina Demopoulos, DDS, MPH
Committee Member, Karl Kingsley, Ph.D. M.P.H.
Committee Member, Charles Hill, DMD
Graduate Faculty Representative, Courtney Coughenour, Ph.D.
Graduate Coordinator, Brian Chrzan, D.D.S., Ph.D.