

**COMPARISON OF COMPLIANCE AND TREATMENT OUTCOME
BETWEEN MEDICAID AND NON-MEDICAID PATIENTS TREATED
IN A UNIVERSITY SETTING**

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A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in the School of Dentistry (Orthodontics).

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ABSTRACT

JEFF BERNDT: Comparison of compliance and treatment outcome between Medicaid and non-medicaid patients treated in a university setting

(Under the direction of Dr. Ceib Phillips)

The objective of this study was to compare the compliance and treatment outcomes of Medicaid and fee for service patients who were treated by the same orthodontist in the same clinic setting. Twenty three patients, enrolled in Medicaid who had completed treatment between 2000 and May 2009 were identified. For each provider a matching number of fee for service patients who met the same inclusion/exclusion criteria were randomly selected from the provider's patient pool. Initial and final models were scored using the Peer Assessment Rating (PAR) Index to assess initial and post-treatment orthodontic outcome. Compliance was measured by reviewing chart entries and recording dates for the following: missed, rescheduled, cancelled and emergency appointments and appointments where the patient presented with a broken appliance. The model analysis of PAR scores showed that there was no difference between Medicaid patients in post-treatment PAR, after adjusting for age, gender and pretreatment PAR. No statistically significant difference between the Medicaid and non-Medicaid groups on compliance. With respect to effectiveness of treatment and compliance, there does not appear to be substantial differences between patients enrolled in Medicaid and those patients that pay privately.

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SECTION I

LITERATURE REVIEW

The Medicaid program in the United States funds dental and orthodontic treatment for minors with severe orthodontic problems and few resources. Established in 1965, Medicaid was created under Title XIX of the Social Security Act as a safety net; it has become the largest source of funding for medical and health-related services for the American poor. The amount of federal funding each state receives is determined by comparing each state's average per capita income to the national average.¹

While each state is allowed to establish its own policies and guidelines as to what services are covered and who is eligible to receive benefits, each guideline must fit within the government's broad regulations. In North Carolina orthodontic treatment is covered by Medicaid for individuals under the age of 21 with characteristics defining them with a functionally handicapped dental occlusion. These criteria include skeletal deformity, severe occlusal discrepancies, moderate-severe crowding, traumatic and deep overbite, protrusive overjet greater than six millimeters, openbite, psycho-social factors, or the potential that all problems will worsen.

The Medicaid Commission Report in 2005 indicated that the Medicaid program is facing financial crisis.² Medicaid expenditures from 1998 to 2003 have risen 62%. When compared to private insurance, public funded medical costs have increased the fastest. Some of the reasons for this are due to the increased costs of services, increased eligibility criteria

that were approved over the past few years, increased population of people requiring long-term care and poor economic periods.

In addition to the increasing need and funding demands, a Medicaid Commission was established in May of 2005, by charter of the Secretary of the United States Department of Health and Human Services, to generate options to save \$10 billion over the next five years in order to ensure sustainability of the Medicaid Program. However, the Medicaid Commission was not successful. The Medicaid Program, continued to be underfunded, eligible recipients continued to grow in light of poor economic growth, and in 2009, a 4.5% cut was made across all Medicaid Programs which increased the financial constraints for the Medicaid dental program.²

The need and demand for orthodontic treatment has been on the rise. The prevalence of orthodontic needs was presented in a study based off the NHANES III survey. The Index of Treatment Need to the survey data showed 57% to 59% of each racial/ethnic group has some degree of orthodontic treatment need.³ Another study determining the demand and need of orthodontic treatment in third and fourth grade children showed that there was a greater demand for orthodontics in higher socioeconomic groups than in lower socioeconomic groups' however the need for treatment was the same in both groups.⁴

In North Carolina, like many other states, few private orthodontic practitioners accept patients enrolled in Medicaid, for multiple reasons leaving, those in need with limited options. In 2008, the orthodontic and pediatric department at the School of Dentistry in Michigan looked at how orthodontists and orthodontic residents (135 residents/568 orthodontists) perceived the quality of their education in preparing them to treat underserved

patients and how it affected their professional attitudes towards caring for an underserved patient population.⁵ It showed that while the majority of residents and orthodontists felt comfortable treating patients of different ethnic backgrounds fewer felt prepared to treat patients on Medicaid. The perception of the study was that the quality of education correlated with professional attitudes and future behavior to treat these patients in underserved populations.⁵

A study in Washington State evaluated the lack of Medicaid orthodontic coverage through a survey of Washington state orthodontists (n=159) which included demographics, attitudes toward early treatment, use of innovations and perceptions of Medicaid.⁶ The majority (99.4%) of the respondents perceived early orthodontic treatment as beneficial. Those orthodontists' working with Medicaid, were more willing to participate in Medicaid early-treatment programs, had fewer patients in other insurance programs, provided more discounted fees, received more inquiries about Medicaid, practiced in rural areas with lower household incomes, reported feeling overworked, but had fewer problems working with the Medicaid system. The main problems identified with Medicaid were an unfamiliarity with Medicaid and the low fee reimbursement.⁶ Medicaid Programs that offer early treatment may increase access to care to those in need if some of the educational and financial barriers are lifted from the participating orthodontists.

A similar study was conducted in North Carolina to evaluate orthodontists' participation and perceptions of the Medicaid Program and to determine whether there are differences between providers who do and do not accept Medicaid patients.⁷ Overall consensus was that the low reimbursement for treating patients enrolled in Medicaid was the major stumbling block. Practitioners who never participated in the Medicaid program had a

tendency to see multiple barriers preventing them from treating this population including: fee reimbursement, difficulty with collections and delays in payments, loss of coverage during treatment, need for prior authorization, difficulty getting answers to billing questions, uncooperative patient behavior and patients failing to show for their appointments. It was also noted that those providers who have treated patients enrolled in Medicaid in the past saw broken appointments and tardiness as a greater deterrent than current providers.⁷

A study evaluating the compliance of appointments was done in Virginia Commonwealth University in Richmond Virginia (VCU) comparing appointment keeping behavior between Medicaid and non-Medicaid patients who received general dental care and orthodontic care. Through a twelve month period, appointments were tallied on 707 patients.⁸ The study supported the concern, of many dental practitioners and orthodontic specialists. Although Medicaid patients had a higher rate of appointment failures than non-Medicaid patients; it was noted that the rate of missed appointments were much lower among the orthodontic patients than by patients seen for general dental appointments.⁸ The average failure rate of VCU Medicaid orthodontic patients was 15% compared to the 30% nationwide failure rate in Medicaid dental clinics as reported by the American Dental Association.⁸

Previous studies comparing the two groups have been inconsistent because the setting for treatment differed between the two groups. In 2002, the Cadman study of Orthodontic treatment outcomes in Alberta, Canada provided a comparison between Canada's Nations (Aboriginal) population and the fee for service patients.⁹ The subjects were selected from three private orthodontic practices in Edmonton, St Albert and Lethbridge, Alberta. Each practice contributed twenty First Nations and 20 non-First Nations subjects to be evaluated.⁹ The study found that patients enrolled in state funded treatment were less compliant than the

fee for service patients, however, the post treatment outcomes, using the Peer Assessment Rating (PAR)¹⁰⁻¹¹ Index, were the same.⁹

A similar study was done in Washington State determining the effectiveness of phase I orthodontic treatment in a Medicaid and private populations. In this study subjects were treated with interceptive orthodontics in two locations. The Medicaid group was treated in a public health clinic in Seattle and the private paying-pay patients were treated at the University of Washington graduate orthodontic clinic. Both groups were treated by UW orthodontic residents and were overseen by UW orthodontic faculty.¹² Effectiveness of treatment was based on the amount of improvement that was seen during this early treatment by measuring pre and post PAR scores.¹⁰⁻¹¹ They found that Medicaid and private-pay patients that started treatment with similar severity, finished with a similar degree of improvement even though the Medicaid patients showed poorer hygiene and missed more appointments in comparison to the private-pay patients. The improvement seen through the PAR scores in both groups did not appear to be associated with compliance.¹²

Another multisite study was done at the University of North Carolina comparing treatment result and of compliance between private practice Medicaid and Non-Medicaid orthodontic patients. 43 Medicaid and 42 Non-Medicaid patients from 9 private orthodontic practices in NC were compared for compliance based on progress notes and Peer Assessment Rating (PAR) Index measured from initial and final models. Treatment outcomes showed no clinical differences between the patients enrolled in Medicaid and private paying patients. As a result, the study revealed that the two groups of patients did not significantly differ with respect to effectiveness of received treatment and compliance with treatment.¹³

Although access to orthodontic care is something many orthodontists take very seriously, the divide between those patients that cannot afford treatment and those that can not appears to be growing. During periods of economic downturn more and more people are becoming dependent on services like Medicaid. For years, the American Association of Orthodontists (AAO) has encouraged members to establish office policies that include treatment for patients that cannot pay. “The AAO also encourages member participation in programs such as Smiles Change Lives, the American Dental Association’s Give Kids a Smile, and Donated Dental Services, a program overseen by the National Foundation of Dentistry for the Handicapped.”¹⁴ Many state dental practice acts charge all licensed dentist with the goal and responsibility to provide quality dental care and to meet the needs of the public. Those states that are not meeting these obligations may resort to legislation that provides these services using alternative personnel. In Washington state, voters approved initiative 607 in 1994 allowing people other than dentists to fabricate dentures for the public. The new profession is called a denturist and they are now a recognized part of the health care profession. Similar legislative efforts have also succeeded in Oregon, Wyoming and Canada.¹⁴ These initiatives provided care to people who needed dentures but could not afford them or could not find a dentist to provide the care. The state government took notice and created a new class of providers who could cater provide the services to these patients. Another example of states developing a new dental profession to meet the demands of the public is Alaska and Minnesota. Recent legislation created a new level of dental health care provider with skills that fall between that of a hygienist and a dentist to help increase the access to care. Lack of access to care can initiate legislative action when empowered by populations in search of alternatives to traditional care.¹⁴

The orthodontic profession consists of a small group of individuals who are highly skilled and educated. The orthodontic profession must have the forethought to provide care to needy patients unable to receive care or be in jeopardy of the community and government responding in similar creative ways to provide the care through legislation.

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SECTION II

MANUSCRIPT

INTRODUCTION

In the midst of the economic downturn and the increase in unemployment, families are relying on government funded programs more than ever to maintain a standard of health.

The Medicaid program in the United States funds dental and orthodontic care, for minors with severe orthodontic problems and few resources.¹ In North Carolina, orthodontic treatment is covered by Medicaid for individuals under the age of 21 with characteristics defining them with a functionally handicapped dental occlusion.¹

In North Carolina, as in many other states, few private orthodontic practitioners accept patients enrolled in Medicaid. Currently in North Carolina only 30 percent of private orthodontic practitioners accept patients enrolled in Medicaid leaving these patients with few treatment options.² In 2003, 84 percent of the orthodontic cases covered by Medicaid in North Carolina were treated by only ten orthodontists.² A North Carolina study evaluated orthodontists participation and perceptions of the Medicaid Program and determined whether there were differences between Medicaid and non-Medicaid participants.² Another study in Washington State evaluated the lack of Medicaid orthodontic coverage by orthodontists and included such variables as demographics, attitude toward early treatment, use of innovations and perception of Medicaid.³ Both studies showed that a primary concern of practitioners treating patients enrolled in Medicaid is patient compliance when compared to fee for service

patients.^{2,7,4,9} A study by the Virginia Commonwealth University compared appointment keeping behavior between 707 Medicaid and non-Medicaid general dental patients and orthodontic patients over a twelve month period.⁴ Although Medicaid patients had a higher rate of appointment failures than non-Medicaid patients; it was noted that the rate of missed appointments were much lower among the orthodontic patients than by patients seen for general dental appointments.⁴ The average failure rate of VCU Medicaid orthodontic patients was 15% compared to the 30% nationwide failure rate in Medicaid general dental clinics according to the American Dental Association.⁴

Orthodontists, particularly those who are not Medicaid participants, perceive that Medicaid patients tend to be less compliant than fee for service patients.^{2,5} Cadman and Mirabelli reported higher rates of missed and cancelled appointments, with patients enrolled in government funded programs. However, the clinical outcome was not significantly different for Medicaid and fee for service patients.^{5,6} Cadman investigated orthodontic outcomes, but used a different PAR index weighting system than used by Mirabelli and Dickens⁷. Mirabelli evaluated mixed dentition in phase I treatment making it difficult to compare treatment outcomes with other studies. Dickens compared single phase orthodontic outcomes by reviewing records of individual private practice orthodontists who treated both Medicaid and non-Medicaid patients in North Carolina and found that outcomes in Medicaid and fee for service groups did not differ significantly. However the sample size was small and patients were treated by different providers in different clinical settings that may have influenced the treatment outcomes.⁷ In order to overcome these limitations, the purpose of this study was to compare patients enrolled in Medicaid and private pay patients matched by treating orthodontist in the University of North Carolina Orthodontic Faculty Practice to

determine compliance and treatment outcomes. Thus, it controlled for care provided by orthodontists under one clinical environment.

MATERIALS AND METHODS

This retrospective research protocol was reviewed and approved by the Biomedical Institutional Review Board at the University of North Carolina.

Subjects:

All subjects were selected from the patient pools of eight orthodontic providers who practiced in the UNC-Chapel Hill School of Dentistry Faculty Practice. Twenty three patients enrolled in Medicaid who had completed treatment between 2000 and May 2009 were identified based on the following inclusion criteria: no significant medical history, under the age of 21, single phase orthodontic treatment and available initial and final models. Patients were excluded if they were medically compromised, over the age of 21, or needed orthognathic surgery. None of the subjects were excluded on the basis of sex or ethnicity. For each provider, a matching number of fee for service patients who met the same inclusion/exclusion criteria were randomly selected from the provider's patient pool.

Data Collection:

All cases were assigned a unique identifier and protected health information was masked. Length of treatment was calculated in months as the difference between the date when fixed orthodontic appliances were initially placed and when the last fixed orthodontic appliance was removed. Compliance was measured by reviewing chart entries, (Ortho II, EPR, traditional paper charts) and recording the date of any of the following: missed, rescheduled, cancelled and emergency appointments and appointments where the patient presented with a

broken appliance. A broken appliance indication included a loose or missing bracket, missing or broken arch wire and any indication of damage to the fixed appliances that required repair before progressing to the next sequence of treatment.

Initial and final models were scored using the Peer Assessment Ratings (PAR) Index to assess initial severity and treatment outcome as originally described by Richmond et al.⁸ The weights as described by Richmond were used in calculating the total PAR score. To avoid bias, the examiner (JB) was masked to the group and treatment time and the models were randomly ordered prior to measurement. The examiner was initially trained and calibrated in 2006 in the use of the PAR index and recalibrated in 2009. At the end of each training session ten randomly selected models were re-measured a second time at least two weeks later. Intra-class correlation statistic and paired t-test were used to estimate the reliability of PAR scoring of initial and final models from replicated scorings.

Statistical Analysis:

For the PAR analysis, general estimating equation (GEE) methods for normal outcomes were used, modeling post-treatment PAR score to Medicaid status, adjusting for pre-treatment PAR score, age and gender. In this analysis, the clustering of attending physicians was also taken into account.

For the compliance data analysis, general estimating equation (GEE) methods with a Poisson link and an offset of months in treatment were used to examine the relationship between each compliance outcome and Medicaid status adjusting for age and gender. In this analysis, the subjects were clustered within attending provider for the PAR data analysis.

RESULTS

Among the eight providers who saw both Medicaid and non-Medicaid patients 70

Medicaid patients were identified, however, only 23 of these cases had both initial and final models. A total of 46 cases were reviewed; by design there were equal numbers of Medicaid versus non-Medicaid patients. There were slightly more females (54%) than males.

The average age of the patients is 13.7 with an average treatment length of nearly 35 months. The average distance of 41 minutes traveled to the clinic. (Table 1)

Patients began treatment with a mean PAR score of 28.5 and concluded treatment with a mean PAR score of 9.6 per patient. (Table 2) On average there were 1.5 canceled; 7 changed; 2.5 missed; 1.4 emergency; 1.3 broken appointments per patient.

Significant differences were found when examining the cohort by payment status, there was no difference in age; length of treatment and compliance measures by Medicaid status. (Table 2) However, patients on Medicaid traveled longer to the clinics than their private insurance counterparts ($p=.033$). The Medicaid patients also had a higher pre-treatment and post-treatment PAR score ($p=.035$, $p=.004$) respectively.

The model analysis of PAR scores showed that there was marginal or no differences between Medicaid patients in post-treatment PAR, after adjusting for age, gender, and pre-treatment PAR.

No statistically significant difference between the Medicaid and non-Medicaid groups on compliance as measured by cancelled appointments ($p=0.26$), changed appointments ($p=0.16$), emergency appointments ($p=0.49$), missed appointments ($p=0.30$), broken appointments ($p=0.25$). Due to analysis constraints, the, appointments with broken appliances, was dichotomized into those with any broken appliances and those with none.

DISCUSSION

Currently, the Medicaid Program is facing a financial crisis, partly due to the increased costs of services, increased eligibility criteria, increased demand and poor general economic growth.² Efforts have been made to sustain the financial viability of the Medicaid Program through a Medicaid Commission established in 2005, however, this has not proven to be successful. In addition to the financial constraints, in 2009, a 4.5% cut was made across all Medicaid funded programs in North Carolina.⁹

Need and demand for orthodontic treatment continues to increase. Based on the NHANES III; Index of Treatment Need 57%-59% of each racial/ethnic group has some degree of orthodontic treatment need¹⁰ Another study determined that despite a child's socioeconomic background, children grouped in the third and fourth grade have the same need for orthodontic treatment.¹¹ Despite the increased demand for orthodontic care, resident training in some programs is falling short of preparing graduates to treat this group of underserved patients. In 2008 a study at the Michigan School of Dentistry examined orthodontists and orthodontic residents' attitude toward their education and found that the majority of the orthodontists and orthodontic residents felt comfortable treating patients of different ethnic backgrounds, but did not feel prepared to treat patients enrolled in Medicaid.¹²

The current study examined the compliance and treatment outcome of eight orthodontists who treat both Medicaid and non-Medicaid patients in a dental school faculty practice. The data suggested that Medicaid patients in this study have no difference in compliance with treatment or difference in the percent of PAR reduction or distribution of final PAR scores. Richmond suggested that >70% PAR reduction reflected a case that was

greatly improved.⁸ The average PAR reduction in the Medicaid group was slightly less than the average PAR reduction in the non-Medicaid group. The mean initial PAR score in the Medicaid group was 7 points higher than in the non-Medicaid group, making it more difficult to achieve equal reductions in PAR scores in both groups.

In terms of treatment results, this study shares the results of two published studies comparing the effectiveness of treatment on government funded populations where both studies reported equal PAR score improvement.^{5,6} However, the results of these two studies are not directly comparable because only mixed dentition treatment was evaluated in the Mirabelli study⁶. Cadman's study used different PAR scale weightings in the study evaluating First Nations patients in Canada.⁵ In addition, this aboriginal population in Canada does not compare directly to the Medicaid population in the U.S. that is comprised entirely of individuals that are economically disadvantaged.

Data on compliance showed no significant differences between the two groups. Patients enrolled in Medicaid did not cancel or change their appointments more than non-Medicaid patients; nor did they have more emergencies or appointments that were missed or presented with broken appliances. Motivation for treatment of an esthetic nature may be a possible explanation for the similarity in compliance between the two groups. The hurdles that are required for patients to receive general dental care through Medicaid before even getting to orthodontics also may have conditioned this group of patients to be equally as responsible.

A limitation of this study was that there were multiple charts and chart entries for each patient. The electronic patient record (EPR), Ortho II computer charting, and the traditional paper charts were all used either separately or in conjunction with one another.

Some of the multiple chart entries did not match the date of treatment or content. Chart entries varied greatly between providers in detail, hand writing legibility and personal abbreviations. Regardless, under the conditions of this study, there was no difference in compliance between Medicaid and non-Medicaid orthodontic patients.

A limitation to evaluating the treatment outcomes of the study is the limited sample size of Medicaid patients seen in the faculty practice between 2000 and 2009. Among the eight providers who see both Medicaid and non-Medicaid patients, 70 Medicaid patients were retrieved from the records. However, only 23 of these cases had both initial and final models. Another contributing factor may be that some practitioners decide to wait on final models to allow for settling and tissue healing and then failed to take records at a later date or the patients also may have failed to return for follow up appointments for final records. In addition, some patients were treated by dual trained providers in other clinics before starting their orthodontic treatment with the same provider, which may have influenced compliance. In spite of these limitations, the scoring of initial and final models is the only way to reliably evaluate quality of care between the two groups.

Although many orthodontists are aware of access to care issues, the specialty is not keeping up with the increased demand necessitated by the Medicaid Program. The American Association of Orthodontists (AAO) has encouraged members to establish office policies that include treatment for patients that cannot afford treatment.¹³ Many States dental practice acts charge all licensed dentists with the goal and responsibility to provide quality dental care and to meet the needs of the public.

Some states have taken nontraditional approaches to providing healthcare services to groups of patients in need. In Washington State, the legislative government created a new

profession called the “denturist” to make dentures for those people who could not find treatment. Similar legislative efforts have also been passed in Oregon, Wyoming and Canada.¹³ Alaska and Minnesota are examples of states that have developed another type of dental profession to meet the demands of the public. These state governments created a new level of dental health care provider with skills that fall between that of a hygienist and a dentist to help increase access to dental care. When confronted with limited access to care, legislative action can be initiated to provide alternatives to traditional care.¹³

Orthodontists as a profession are a small group of highly trained and caring individuals. It may be considered wise and possibly shrewd of such a group to have the forethought of giving back to the local community, possibly in new and imaginative ways, before the community and government respond in new and creative ways of their own to provide universal care.

CONCLUSIONS

- No statistical difference between Medicaid in post-treatment PAR (adjusting for age, gender, and pre-treatment PAR)
- No statistical difference between Medicaid and non-Medicaid groups with compliance (cancelled, changed, emergency, missed appointments or appointments with broken appliances)

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Table 1.

Patient Demographics	Mean (SD)	Med (IQR)
Age	13.7 (2.7)	13.28
Treatment Time (months)	34.7 (14.1)	32.00
Distance (minutes)	40.8 (43.9)	22.00
Gender N (%)		
Female	25 (54)	
Male	21 (46)	
Insurance N (%)		
Medicaid	23 (50)	
Non-Medicaid	23 (50)	

Table 2.

Patient Treatment Data	Mean (SD)	Med (IQR)
Pre-TX PAR	28.5 (11.2)	25.5
Post-TX PAR	9.6 (8.1)	8.5
Canceled Appts	1.46 (1.6)	1.00
Changed Appts	6.98 (4.5)	6.50
Missed Appts	2.52 (2.8)	2.00
Emergency Appts	1.39 (1.63)	1.00
Broken appliances	1.26 (1.90)	0

**Comparison of Final PAR Scores for Payment Groups
After Adjusting for Pre-Tx PAR, Age and Gender**

