Abstract: Medicaid is a needs-based program in the United States that subsidizes medical-dental care for minors. Purpose: To test for compliance differences between self-pay and Medicaid-supported patients. Methods: Medicaid patient records (n = 88) were perused retrospectively for characteristics that distract from an orthodontist’s workflow (missed appointments, broken brackets, treatment duration, etc.) and compared to a sample (n = 145) of self-pay cases from the same teaching clinic. Differences in treatment difficulty were adjusted by case selection and statistically (ANCOVA). Results: Medicaid cases were younger ( = 14.1 years versus 14.9) and significantly more likely to be dismissed from treatment (19% vs 4%), generally for noncompliance. Broken brackets and missed appointments were more common in the Medicaid sample. There was no difference in number of appointments in those completing treatment, but treatment duration was significantly longer in the Medicaid cases completing treatment (29 versus 25 months). Conclusion: Greater difficulty in managing Medicaid patients may partly explain their being underserved. Prospective studies are needed to clarify causes of the differences.
COMPLIANCE IN STATE-SUBSIDIZED AND SELF-PAY
ORTHODONTIC PATIENTS

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**Highlights**

- Test for compliance differences between self-pay and Medicaid-supported patients treated in the same clinic.

- Differences in treatment difficulty were adjusted by case selection and statistically.

- Medicaid cases miss significantly more appointments on average.

- No difference in number of appointments in those completing treatment, but treatment duration was significantly longer in the Medicaid cases completing treatment (29 versus 25 months).

- Medicaid patients are more likely to drop out of orthodontic treatment prior to completion.
ABSTRACT

Medicaid is a needs-based program in the United States that subsidizes medical-dental care for minors. **Purpose:** To test for compliance differences between self-pay and Medicaid-supported patients. **Methods:** Medicaid patient records (n = 88) were perused retrospectively for characteristics that distract from an orthodontist’s workflow (missed appointments, broken brackets, treatment duration, etc.) and compared to a sample (n = 145) of self-pay cases from the same teaching clinic. Differences in treatment difficulty were adjusted by case selection and statistically (ANCOVA). **Results:** Medicaid cases were younger ($\bar{x} = 14.1$ years *versus* 14.9) and significantly more likely to be dismissed from treatment (19% *vs* 4%), generally for noncompliance. Broken brackets and missed appointments were more common in the Medicaid sample. There was no difference in number of appointments in those completing treatment, but treatment duration was significantly longer in the Medicaid cases completing treatment (29 *versus* 25 months). **Conclusion:** Greater difficulty in managing Medicaid patients may partly explain their being underserved. Prospective studies are needed to clarify causes of the differences.
INTRODUCTION

In 1966, a task force formed through the American Dental Association recommended that treatment of malocclusions should be included as part of covered treatment services for certain individuals. The following year, 1967, dental care, including orthodontic treatment for handicapping malocclusions, was made available to Medicaid-eligible citizens less than 21 years of age. Treatment of these qualified minors is considered “medically necessary.”

Medicaid is a needs-based insurance program funded at both a state and federal level. Medicaid and the smaller Children’s Health Insurance Program (CHIP) cover 1 in every 3 children in the United States, which is more than 31 million children in total. Each state possesses unique rules that determine orthodontic eligibility, controlled in part by the state’s financial situation.

There has been a considerable increase in the number of individuals enrolled in Medicaid, mostly children. However, only a small proportion of orthodontists provide treatment to Medicaid patients, leaving a large, underserved pool of children without access to orthodontic care despite being eligible through Medicaid. In Washington State, approximately 25% of orthodontists participated in Medicaid in 1999 but most only treated a few patients. Only 10 orthodontists provided 81% of the Medicaid-funded orthodontic treatment statewide. In North Carolina, just 10 orthodontists provided 80% of the statewide Medicaid orthodontic treatment.

Several studies have aimed at answering the question, “Why are providers reluctant to accept Medicaid patients?” The most common answers are (1) low fee reimbursement, (2) broken appointments, and (3) excessive and/or complex paperwork. Additional reasons for low participation include (1) difficulty in collecting fees from Medicaid, (2) delays in receiving payments, (3) prior authorization requirement, (4) potential for loss of coverage during
treatment, (5) high patient non-compliance, (6) patients not meeting appointments, (7) patients arriving late to appointments, and (8) patients canceling appointments at the last minute.9

Orthodontists are not alone in their reluctance to treat Medicaid patients. Pediatric dentists choose not to participate or limit their participation in Medicaid due to broken or canceled appointments and poor patient compliance.3,10,11 Pediatric Medicaid patients miss significantly more appointments than non-Medicaid patients.8,12

Arguably, the biggest aspect of orthodontic compliance is meeting appointments.13-15 With orthodontic treatment lasting two or more years, maintaining appointments is important. In a study conducted at the Department of Orthodontics, Virginia Commonwealth University, Medicaid patients failed to meet 15% of their appointments and self-pay patients failed 8% of their appointments8, a highly significant statistical (and financial) effect.

However, in a study conducted in North Carolina, researchers surveyed orthodontists and reported that Medicaid and non-Medicaid patients did not differ substantially with respect to effectiveness of treatment or their compliance with treatment.11 Due to limited and conflicting claims, the present study evaluated the compliance between self-pay and Medicaid patients receiving comprehensive orthodontic treatment.

**MATERIAL AND METHODS**

Institutional Review Board approval was granted for this retrospective study of patient records. Medicaid cases (n = 88) were from the postgraduate orthodontic clinic at the ••••••••••••. Records were hand-searched, selecting recently completed, full-treatment cases (2007-2012); this included finished cases in retention. A sample of 145 self-pay control records of adolescents was also analyzed, the one inclusion criterion was a high Discrepancy Index (≥ 14) assessed by the ABO Discrepancy Index (DI) method.16 The ABO Discrepancy Index—like all summary
measures—is an imperfect measure of case difficulty, but it is commonly employed and familiar to most orthodontists. Each patient’s record was perused to collect pertinent information (Table I). Because the study was retrospective, no standardized measure of oral hygiene could be formulated, though a potential difference here (and in demineralized spots) would be informative. Most cases completed treatment, but those who had to be dismissed from the clinic were eliminated from analysis as indicated. Start of treatment was defined as the initial placement of appliances ( = 14.6 years; not initial records). End of treatment was the final treatment appointment when appliances were removed ( = 18.8 years), not the final records appointment.

The data were either nominal (e.g., boy, girl) or ratio-scale (continuous). Statistically significant differences for the nominal data were tested with Fisher’s exact tests, while continuous data were assessed with analysis of variance. Correction was not made for multiple comparisons; an alpha of 0.05 was pre-set as the level for significance and all tests were two-tail.

RESULTS

Statistical results are listed in Table I. There was no significant difference for starting age between payment method (self-pay versus Medicaid), but the duration of treatment and the patients’ chronological age at the end of treatment were both statistically different. The sex distribution did not differ between groups, because both groups had a preponderance of girls (60%; 140/233).

Most of the Medicaid patients were American blacks (86%; 76/88); most of the self-pay cases were American whites (81%; 118/145), producing a significant difference in proportions (P < 0.0001). This created a high odds ratio of 26.5 (95% confidence limits of 12.0 and 58.6).
meaning that blacks were more likely than whites (26.5 times) to have treatment financed by Medicaid, but this race difference may be limited to this region of the country.

The Medicaid group had a significantly higher Discrepancy Index, because this (and patient age) is the prime measure of eligibility. Cases with low DI scores tend not to be eligible. DI of the Medicaid sample had a lower limit of 11 (\( \bar{X} = 23.2; sd = 7.7; range = 11 \) to 55). This resulted in a highly significant difference in DI because it was impractical to find a self-pay sample with equivalent scores (\( \bar{X} = 19.6 \) DI in self-pay \textit{versus} 23.2 in Medicaid; \( P < 0.0001 \)). This disparity was treated statistically by using the patient’s DI as a covariate,\(^{23}\) but the adjustment had no important effect on the results, so those results are not shown. Also, DI was not predictive of treatment duration in either payment group.

Age at start of treatment did not differ statistically (\( P = 0.0831 \)) for those cases completing treatment, nor did the number of appointments (\( P = 0.2223 \)). The frequencies of cases treated with permanent tooth extractions (ranging from 1 to 5 teeth) did not differ between groups (\( P = 0.2201 \)), but the mean number of teeth (excluding M3s) was marginally higher (\( P = 0.0464 \)) in the Medicaid group (means of 1.8 and 2.3 teeth), perhaps because of higher DI.

A significantly greater frequency of Medicaid patients experienced dismissal from treatment prior to completion, mostly for noncompliance (19\% \textit{versus} 4\%). By odds ratio, the Medicaid cases were 5.5 times as likely to be dismissed as the self-pay cases (95\% confidence limits 2.09 and 14.69).

The average number of detached brackets did not differ statistically between groups (\( P = 0.4955 \)). The grand average was 25.0 appointments (\( sd = 6.6 \)), distributed across an average of 26.5 months in this teaching environment.
Neither the number of broken brackets (grand $\bar{x}$ brackets = 3.5; sd = 4.06) nor the number of broken appliances (grand $\bar{x}$ = 0.13 appliances; sd = 0.51) differed significantly by payment method; both were uncommon. The number of broken appliances ranged from none to 5. Treating these data as nominal (no, yes), the frequencies still did not differ significantly, though the incidence was higher in the Medicaid sample (8% versus 13%).

Missed appointments were more common in the Medicaid sample ($P < 0.0001$). The average number of missed appointments was 1.0; those cases missing more than 1 appointment were flagged in the dataset. The Medicaid sample exceeded this average 65% of the time versus 24% in the self-pay sample. By odds ratio, the Medicaid sample was 5.97 times as likely to miss an appointment as the self-pay group (CL of 3.14 and 11.11).

**DISCUSSION**

Patient compliance throughout orthodontic treatment is important to achieve the desired result in a predictable amount of time. One component of orthodontic compliance is maintaining and regularly attending scheduled appointments. The present study revealed that Medicaid patients averaged 3 more missed appointments compared to self-pay cases treated in the same clinic. These results are congruent with those of Horsley et al. who found that orthodontic Medicaid patients were nearly twice as likely to miss an appointment compared to self-pay patients.

Our findings differ from Dickens et al. who reported no important difference in orthodontic treatment and compliance between Medicaid and self-pay patients. This could be related to the low response rate from orthodontists willing to participate in their study, just 9 out of 55. It also could be related to a lack of standardized chart documentation between participating orthodontists to properly assess patient compliance. These authors speculated that
it is possible to deliver a high level of care for orthodontic Medicaid patients without the poor patient compliance described in prior studies.

Dickens et al. contended that Medicaid patients are motivated for an esthetic change, and this explains the lack of compliance difference they found. However, the patient’s guardian is ultimately responsible for the minor’s attendance despite the patient’s motivation for an esthetic change so this is not a feasible explanation.

The present study implies that there is a clinical impact of compliance between Medicaid and self-pay patients. Compared to self-pay patients, Medicaid patients were more than 4 times more likely to be dismissed from treatment before completion. Approximately 1 out of 5 Medicaid patients did not complete orthodontic treatment as originally prescribed, and appliances were either removed early or the patient never returned to the clinic. Self-pay patients completed treatment 96% of the time compared to 81% of Medicaid patients.

The present study revealed a notable compliance issue of dismissal from treatment before completion. Not following through with orthodontic treatment is a major issue, particularly in Medicaid patients because they tend to have the most severe malocclusions. This particularly affects irreversible procedures such as dental extractions, which could be harmful to patients who do not complete treatment.

Limitations of the present study can be attributed to the reliance on completed treatment records, and the possible lack of standardization in recording each patient's treatment record, but it is supposed that any deficiencies would be equally distributed among all patients, making this issue of minor importance when evaluating observed treatment trends between Medicaid and self-pay patient groups.
Medicaid was developed to provide access to care for the underserved regardless of geographic position. The plan was to allow practitioners to treat Medicaid patients in private practices rather than having a central Medicaid clinic. This concept relies on the practitioners’ willingness to accept and treat Medicaid patients. Currently, there is a general lack of orthodontists doing so. Many reasons have been cited, but no study has mentioned dismissal from treatment as a reason not to treat Medicaid patients.

Two major problems with the current system for providing orthodontic services to Medicaid patients are (1) lack of provider participation and (2) poor compliance in the Medicaid patients. To properly address the major issue of providing treatment to the underserved, research needs to address the reason for this depressed compliance. One explanation is related to the unique nature of orthodontics. Orthodontic treatment is different from routine medical and dental procedures. A dentist treats a carious tooth with a restorative procedure that is normally completed in one visit, whereas comprehensive orthodontic treatment can consist of two or more years with frequent visits. Medicaid patients may not appreciate the scope of orthodontic treatment and the commitment required to successfully treat difficult malocclusions. This is a plausible explanation for orthodontic Medicaid patients, but it does not address poor compliance observed in pediatric Medicaid patients.

**CONCLUSION**

This retrospective study reviewed treatment records of 88 phenotypically normal Medicaid patients and 145 self-pay controls. Compared to self-pay subjects, Medicaid cases miss significantly more appointments on average. Medicaid patients are more likely to drop out of orthodontic treatment prior to completion than non-Medicaid patients.
REFERENCES CITED


Table I. Outcome of payment methods according to other independent variables.

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¹Abbreviations of the statistical tests used were Fisher’s exact test (FET, for nominal data) and analysis of variance (ANOVA, for continuous data). Tests were two-tailed.

²Cases completing treatment.
Ms. Chris Burke, Managing Editor  
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