

**BREAK-EVEN ANALYSIS OF MEDICAID VERSUS FEE FOR
SERVICE IN ORTHODONTIC PRACTICE: NORTH CAROLINA AS
A CASE STUDY**

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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

**JOHN MURDOCK: Break-even Analysis of Medicaid versus Fee for Service in
Orthodontic Practice: North Carolina as a Case Study
(Under the direction of Dr. Ceib Phillips)**

The purpose of this study was to examine the potential profitability of treating patients covered by Medicaid in NC orthodontic practices using the break-even analysis. Questionnaires were mailed to 154 orthodontists in active practice in NC. Respondents were categorized into 4 groups based upon the number of 2005 Medicaid case starts. On a per case basis, assuming the break-even point had not been reached, three groups realized a potential profit for each Medicaid case treated. For each of the groups analyzed the inclusion of 5% Medicaid cases in the treatment pool did not substantially increase the practice break-even point. Assuming the break-point had been reached, all groups realized per case profits for each Medicaid case treated. Once the break-even point is reached, the inclusion of a small percentage of Medicaid patients can increase practice profitability while helping to address the current challenges with improving access to care for underserved populations.

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SECTION I

LITERATURE REVIEW

Title XIX of the Social Security Act is a federal and state entitlement program that pays for medical assistance for certain individuals and families with low incomes and resources. This program, known as Medicaid, became law in 1965 as a cooperative venture jointly funded by the federal and state governments (including the District of Columbia and the Territories) to assist states in furnishing medical assistance to eligible needy persons. Medicaid is the largest source of funding for medical and health-related services for America's poorest people. Within broad national guidelines established by federal statutes, regulations, and policies, each state (1) establishes its own eligibility standards; (2) determines the type, amount, duration, and scope of services; (3) sets the rate of payment for services; and (4) administers its own program. Medicaid policies for eligibility, services, and payment are complex and vary considerably, even among states of similar size or geographic proximity. Thus, a person who is eligible for Medicaid in one state may not be eligible in another state, and the services provided by one state may differ considerably in amount, duration or scope from services provided in a similar or neighboring state. In addition, Medicaid eligibility and services within a state can change during the year.¹

Dental services under Title XIX of the Social Security Act, the Medicaid program, are an optional service for the adult population, individuals age 21 and older.

However, dental services are a required service for most Medicaid-eligible individuals under the age of 21, as a required component of the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit.¹

The State of North Carolina (NC) submitted its Medicaid State Plan to the Health Care Financing Administration in 1969 and received approval that year. NC General Statutes, Chapter 108A is the law that implemented Title XIX in North Carolina, thus beginning the NC Medicaid Program, on January 1, 1970 under the direction of the NC Division of Social Services. In 1978, the Department of Human Resources (which has since been renamed the Department of Health and Human Services (DHHS)) created a new division within the department entitled the Division of Medical Assistance (DMA). The Medicaid program was transferred from the Division of Social Services to the new division at that time.²

Federal, state and county governments jointly finance the NC Medicaid Program, with the federal government paying the largest share of the costs. In NC, the 100 county governments contribute 15 percent of the non-federal share of costs. The federal share of costs for services is established annually by the Centers for Medicare and Medicaid Services (CMS). CMS calculates its share based on the most recent three-year average per capita income for each state and the national per capita income. As NC's per capita income rises, the federal match for Medicaid declines, requiring the State and the counties to increase their share of Medicaid payments. The rate of federal reimbursement ranges from a low of 50% to a high of 75%. In NC, the legislature requires our 100 county governments to contribute to the non- federal share of Medicaid costs. Those

county costs are generally limited to 15 % of the non-federal share, with the state picking up the remaining 85%. ²

Medicaid programs will only fund orthodontic treatment for “functionally handicapping” conditions. The likelihood of approval for orthodontic treatment increased when two or more of the following criteria exist: severe skeletal condition; severe occlusal discrepancies or crossbites with functional shifts; functionally intolerable moderate to severe crowding; traumatic deep bite; an overjet of 6+ mm; an openbite greater than 4 to 5mm; psychological and emotional factors; and potential that all problems will worsen. Orthodontic services are not covered in NC for the following types of cases: early treatment cases in the mixed dentition; interceptive orthodontics; minor tooth movement cases; canine impactions with a poor prognosis; posterior crossbites without a functional shift or history of temporomandibular dysfunction; Class I malocclusions with moderate crowding; mild to moderate anterior spacing; simple one arch treatment; localized tooth alignment problems; and cases begun prior to Medicaid eligibility.

As of fiscal year 2003, only 55 practices including Orthodontists, Pediatric Dentists and General Dentists were enrolled Medicaid providers accepting Medicaid coverage of orthodontic services. The number of cases approved for Medicaid coverage increased from 3680 cases in 2004, to 5044 cases in 2005 (N.C. DHHS). This occurred without a significant increase in the number of practitioners providing orthodontic treatment for the Medicaid population.

Surveys of orthodontists have consistently reported that community-based practitioners perceive two barriers to the inclusion of Medicaid enrolled patients into their practices: poor patient compliance and low fee reimbursement.^{3,4} Im et al⁴ found that approximately 80% of NC orthodontists who had never accepted Medicaid enrolled patients cited issues related to disruption of practice efficiency (no show/cancellation/tardiness) as major problems even though they had not had direct experiences. They also found that eighty-one percent of past providers who had stopped accepting Medicaid reported that broken appointments and tardiness were major problems, which may have influenced their decision to discontinue accepting new Medicaid enrolled patients. Although these surveys were only evaluating the perceptions held by the practitioners the results of recent studies tend to offer support to their concerns.^{5,6,7}

Medicaid enrolled patients treated in the Graduate Orthodontic Clinic at Virginia Commonwealth University (VCU) missed appointments, on average, at an increased rate when compared to their non-Medicaid counterparts.⁸ Similar findings were reported from community-based orthodontic practices. One community-based study in Canada compared publicly-funded patients with private-pay patients relative to patient compliance issues. Another study from Washington State compared Medicaid patients from a community clinic with non-Medicaid patients seen in the University of Washington (UW) graduate orthodontic clinic. Both studies concluded that the publicly-funded patients missed significantly more appointments and also demonstrated poorer hygiene.^{5,6} The clinical settings of these studies however (university graduate

clinic at VCU¹⁷; community-based Medicaid vs. graduate non-Medicaid at UW⁶; Canadian healthcare system⁵) may limit the generalizability of their findings.

A recent study,⁷ comparing Medicaid and non-Medicaid enrolled patients treated within the same NC community-based practices, contradicted the findings of the previous studies. When Medicaid and non-Medicaid patients were treated in the same clinical setting, there were no statistically significant differences between the two groups of patients for the average number of missed appointments, broken appliances, and poor oral hygiene comments. Interestingly, the treatment times and total number of appointments for both groups across all practices were approximately equal. Despite differences among these studies in findings relative to Medicaid and non-Medicaid compliance issues, all the studies have indicated that these issues do not affect the clinician's ability to treat Medicaid enrolled patients in a timely fashion with an esthetic result.^{5,6,7}

The other consistent problem cited by dental professionals as a major barrier to Medicaid participation is low fee reimbursement.^{3,4,9-11} Many practitioners place some limit on or deny access completely to their practices for Medicaid patients, with the belief that treating Medicaid patients will result in a net loss of income.^{4,12}

No research to date has looked at the financial impact of incorporating Medicaid enrolled patients into a community-based orthodontic practice. In order to test the validity of this widely held perception one should not solely look at the absolute profit/loss on a per case basis. Instead it is more prudent to evaluate how the incorporation of Medicaid would affect the profit/loss of the practice as a whole. Break-even analysis provides a means to accomplish this.

Break-even analysis is a financial tool that relates the cost of doing business with the financial compensation for services rendered and examines activity volumes where financial costs equal total revenue. Breakeven analysis gives healthcare financial managers a tool for weighing the potential profitability of adding a new service. The method estimates profit or loss at various usage levels, showing at what level costs and profits meet.¹³ This method of analysis requires knowledge of both fixed and variable costs. Fixed costs are those that remain unchanged over a defined period of time. Examples include rent, outlays for equipment and some utility costs. Variable costs, in contrast, change in direct proportion to the level of activity.

For example, consider the following scenario relating to an orthodontic conference:¹⁴

Total Fixed Expenses

Brochures	\$250
Mailing	\$150
Speaker Fees	\$500
Room Rental	\$100
TOTAL	\$1000

Variable Expenses (Per Participant)

Lunch and Breaks	\$12
Conference Packets	\$3
TOTAL	\$15

The following equation is used to calculate the break-even point:

$$PQ = FC + VC + Pr$$

Where P = Price; Q = Quantity; FC = Fixed Cost; VC = Variable Cost; and PR = Profit.¹⁴

With a registration fee of \$40, profit set at zero and x = number of participants, the calculations can be completed:

$$\$40x = \$1000 + \$15x + 0$$

$$\$25x = \$1000$$

$$x = 40$$

Therefore, the break-even point for the conference would be reached after registering 40 participants. Although simplified this example illustrates the basic concept of the break-even analysis. Our purpose is to use this concept to examine the potential profitability of treating patients covered by Medicaid in community-based orthodontic practices in NC.

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SECTION II

MANUSCRIPT

INTRODUCTION

Access to orthodontic treatment for children from low-income families enrolled in Medicaid is limited nationwide despite the estimated 14.2 % of children and 29% of adolescents with severe to very severe handicapping malocclusion.^{1,2,5,6} Although orthodontic treatment need is similar across all economic groups, less than 0.5% of Medicaid eligible children in North Carolina (NC) received any orthodontic care during 2002-2003.

Nationwide, the low participation rate by orthodontists in Medicaid programs is an important contributing factor to the discrepancy in the utilization of orthodontic treatment. In NC, only 8% of the approximately 230 practicing orthodontists were listed as significant Medicaid providers (filing claims for at least ten new Medicaid recipients) for the last quarter of 2005.⁷ The most significant problem cited by orthodontists with Medicaid participation is the low fee reimbursement.¹ Many practitioners have the perception that treating a child enrolled in Medicaid will result in an “out of pocket” loss. However, the financial impact of incorporating Medicaid patients into an orthodontic practice should not be based solely on the absolute profit or loss on a per case basis but rather on a more global evaluation of how the incorporation of Medicaid reimbursement would affect the profitability of the practice as a whole.

Breakeven analysis is a financial assessment tool that can provide estimates of how a change in practice (for example, changing fee structure or the number of cases started per year) will affect overall profitability. Break-even analysis relates the cost of doing business (fixed and variable costs) to the financial compensation for services rendered and examines the activity volumes necessary for financial costs to equal total revenue.^{8,9,10} The purpose of this study was to examine, using break-even analysis, what effect altering the percentage of patients covered by Medicaid in the patient pool would have on the potential profitability of community-based orthodontic practices in North Carolina. Given the 2005 Medicaid level of reimbursement, the specific aims were to examine whether, on a per case basis, the treatment of a child enrolled in Medicaid would result in a reduced net profit or a financial “out of pocket” loss; and what effect a 5% increase in the total number of patients treated, given that this increase represents patients enrolled in Medicaid, would have on an orthodontic practice’s break-even point and profit margin.

MATERIALS AND METHODS

Subjects: One hundred fifty four orthodontists practicing in NC during 2005 were mailed a survey approved by the Biomedical Institutional Review Board at the University of North Carolina. Practitioner information was obtained from the NC Health Professions Data System (HPDS). Respondents were included if they were in active solo practice defined as working a minimum of 24 hours per week; grossed a minimum of \$60,000 in 2005; and had at least 50 orthodontic case starts.

Survey procedures: A cover letter describing the study, a questionnaire, and a postage-paid return envelope was sent to each orthodontist. Second and third follow-up

materials were sent to non-respondents. The survey methods outlined in Salant and Dillman¹¹ were used as a guide. Data collection occurred between August and December 2006. *Survey materials:* A 22 item questionnaire was developed with the assistance of a practice management consultant and pilot tested by part-time orthodontic faculty. The survey instrument focused on two general areas of practice management: 1) practice demographics regarding the number of patients and the length of treatment and 2) financial information regarding costs of overhead and treatment fees. Practitioners were also asked, while maintaining the same staff and facility in place and without making any practice changes, how many more cases, as a percentage of the current patient pool, could be incorporated into their practices. Respondents were asked to respond using 2005 fiscal year data.

Analysis: Personal practice gross income data was not requested. Gross incomes were estimated based on practice fees, treatment times, and overhead percentages. Respondents were categorized into 4 groups based upon the number of total Medicaid cases started in 2005 (Group I= 0, Group II= 1-5, Group III= 6-12, Group IV= 13+). For each group, the average per case (fixed + variable) cost of treatment was calculated. The average per case cost was then used to calculate 1) the per case profitability for a patient covered by Medicaid before a break even number of cases has been reached (both fixed and variable costs are considered), 2) the initial break-even point 3) the per case profitability for a patient covered by Medicaid after the break-even point has been reached (only variable cost is considered) and 4) the breakeven point after an increase in the patient pool of 5% assuming all additional cases were children enrolled in Medicaid. A simulation was performed to compare the initial break-even points in

Groups I,II, and III with the break-even points after the 5% increase in the total number of patients treated. No simulation was performed for Group IV since this group already had a patient population with greater than 5% of the patients enrolled in Medicaid. The 2005 NC Medicaid reimbursement rate for comprehensive orthodontic treatment of \$2,521 was used. .

The following assumptions were made relative to the break-even calculations for fiscal year 2005:

1. All practices were assumed to have a 95% collection rate.
2. All children and adults were assumed to have paid one-half the typical fee for treatment in 2005. (No Phase I or Limited Treatment)
3. Medicaid case starts for 2005 were the only Medicaid patients assumed to be in the practice.
4. All treatment was assumed to have been carried out over a two year period.

Due to these assumptions the profits projected may be high. The effects of the assumptions are constant across all practice groups and therefore should not affect the comparison of groups.

RESULTS

Responses of seventy of the one hundred and fifty-four orthodontists were included in the analysis (Figure I). The majority of respondents reported 0 Medicaid case starts (Group I) in 2005 (Figure II). This group had the highest average adult and child full treatment fees and had been in practice the least amount of time (Table I). The average number of Medicaid case starts in Groups II, III, and IV were 3, 9, and 30

respectively. All respondents indicated a potential to increase the number of cases that could be treated while utilizing their current staff. Across all respondents, the average potential increase reported was 8%. (Table I).

In the per case profitability calculation for Group I, an estimated loss of \$164 would occur for each Medicaid case treated when both fixed and variable per case costs are included while for the other three groups estimated profits per case ranged from \$98 to \$256 (Table II). The estimated loss per Medicaid case for Group I was due in part to the group's higher average per case cost of treatment (Table II). Group III despite having a smaller patient population (average = 387) than Group I (477), had an estimated per case profit because of the lower overhead costs (III: 49% vs. I: 55%).

The initial break-even number of patients (Figure 3) ranged from 158 (Group III) to 234 (Group IV). The number of patients reported by all practitioners exceeded the initial break-even number of patients calculated for their respective group. When only variable costs per case are considered, as would be the case after the break-even point had been reached, all groups realized per case profits ranging from \$1,483 to \$1,897 (Table II).

Respondents reported that, on average, their patient populations could be increased by 7 to 9 percent with no change in existing staff (Table I). Given this, our proposed 5% increase in the patient population in the simulation study for Groups I, II, and III appeared feasible. The break-even point after the increase in the number of Medicaid cases in the patient population did not change dramatically for any of the groups (Figure 3). The largest increase in the patient population needed to reach the break-even point was observed in Group I, reflecting the higher variable cost of

treatment per case in this group (Table II). The simulation estimated an overall total profit for all groups after the increase in the number of cases to represent an inclusion of 5% Medicaid cases. This profitability reflects an existing patient base in all groups that exceeded the simulated break-even point (Table III) such that each Medicaid case added to the existing patient population incurred only a variable cost.

DISCUSSION

A consistent problem cited by dental professionals as a major barrier to Medicaid participation is low fee reimbursement.^{1,6,12-14} Many orthodontists have the perception that treating a Medicaid case will result in an “out of pocket” loss since the reimbursement rate is substantially lower than the average fee most orthodontists charge. The 2005 NC Medicaid reimbursement was \$1,379 below the minimum and \$3,659 below the maximum average child full treatment fees reported by respondents to our survey.

Even though reimbursement is well below community pricing standards, our findings indicate that inclusion of a small percentage of Medicaid cases would not result in a financial “out of pocket” loss for the average orthodontic practice. Instead, this patient population could be seen as a viable source of profit. With a 5% Medicaid inclusion the simulation study indicated potential profits in the range of \$10,000 to \$18,000. This is not to say that an additional increased profit would not be seen if the increase were an equivalent number of fee for service patients. However, these findings suggest that serving the underprivileged while utilizing the existing infrastructure could fill an otherwise void area in a practice.

Nationally the American Association of Orthodontists has been tasked by the House of Delegates to work with the American Dental Association and other dental organizations in order to increase access to quality orthodontic care for patients in need.¹⁵ In 2007 the North Carolina Association of Orthodontists discussed the possibility of appointing a committee to work with Social Services to facilitate greater access to orthodontic care for Medicaid-eligible children. However, to date no action has been taken.¹⁶

Increasing the Medicaid reimbursement rate might increase orthodontic participation in the program. When implemented properly, increasing reimbursement rates to the 75th percentile of usual and customary fees has helped to provide significant increases in participation in other areas of dentistry, including pediatric dentistry.^{17,18}

The findings of the present study are not strictly generalizable to individual practices given the assumptions made relative to the break-even calculations and the use of estimated gross incomes. However, the break-even analysis calculations are relatively straightforward and could be implemented in individual practices. Given the number of patients in each respondent's practice, it is unlikely that any of the practices would realize an "out-of-pocket" loss from the inclusion of a small number of patients enrolled in Medicaid.

The ultimate goal as an orthodontic community should be to improve access to orthodontic care for the under-privileged. For example in 2005 there were 881,356 Medicaid eligible children in NC and only 40 orthodontists who accepted new Medicaid patients. Strategies need to be designed and implemented that more

effectively address this unmet need and allow the Medicaid enrolled population to receive orthodontic treatment.

CONCLUSIONS

This study examined the potential profitability of orthodontic treatment of patients covered by Medicaid in North Carolina by using break-even analysis. Our results are intended to offer insight into a basic economic concept and possible applications to an orthodontic practice. Under the conditions of this study, we conclude the following:

- Having 5 % of Medicaid enrolled patients as part of a practice's active patient pool has minimal effect on a practice's financial break-even point.
- After the break-even point has been reached in a community-based practice, a profit will be realized for each Medicaid case treated (Groups 1-4).
- Regardless of the current number of Medicaid enrolled patients in a practice, increasing the total number of cases treated to reach a 5% Medicaid inclusion would increase overall practice profitability by \$10,000- \$18,000.
- The treatment of a small percentage of Medicaid enrolled patients would help to address the current challenges with improving access to care for underserved populations.

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Figure I Survey Response and Reasons for Exclusion

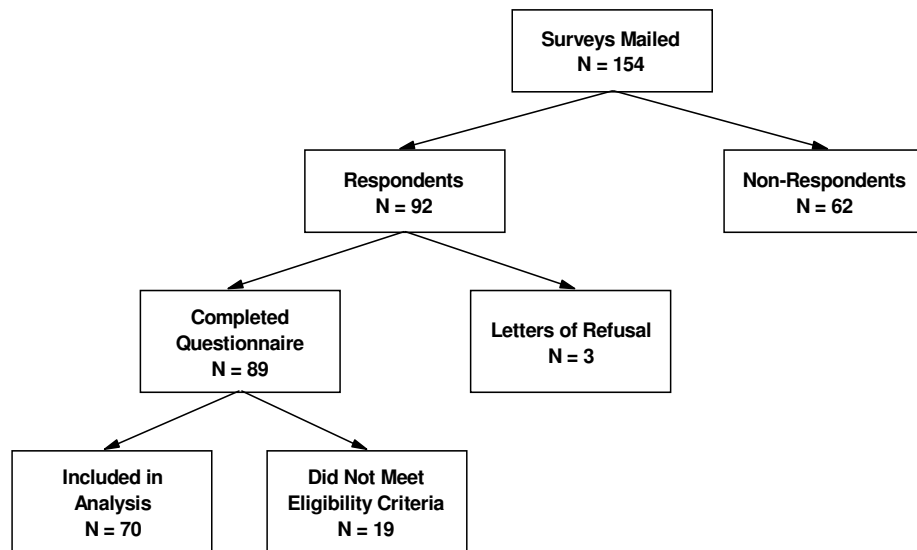


Figure II Percentage of Respondents in Each Group Based on the 2005 Number of Patients Started who were Enrolled in Medicaid and the Average Number of Medicaid Case Starts in Each Group

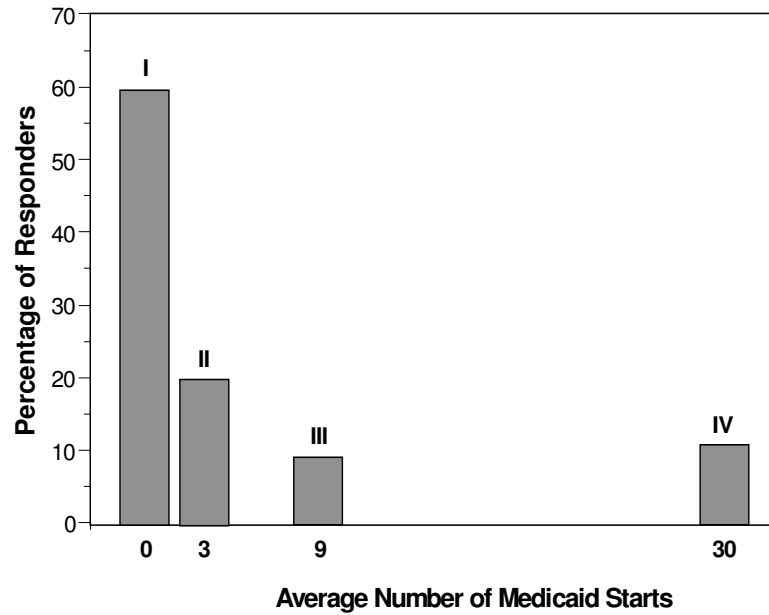


Figure III Initial Break-even Point for Each Group and Simulated Break-even Point for Each Group after inclusion of 5% Medicaid Enrolled Patients

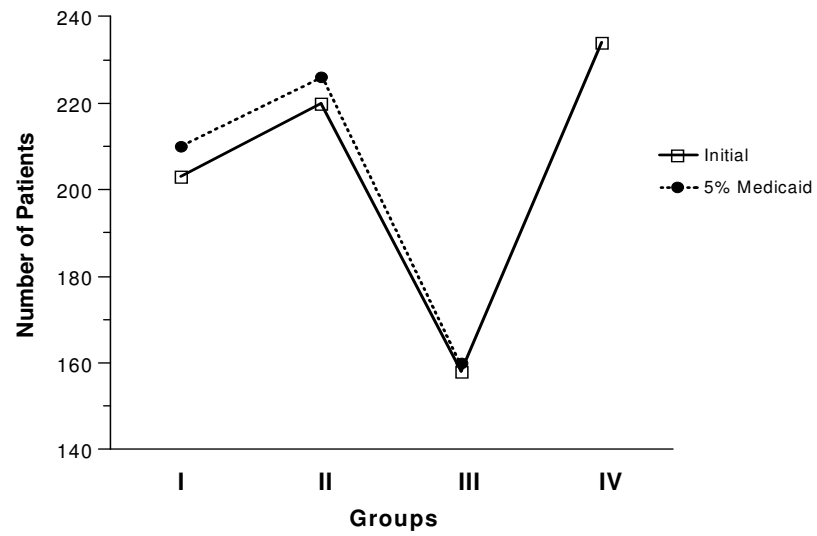


Table I. Mean and Standard Deviation for the Practice Demographics for Each Group Categorized on the Basis of the Number of Patients Enrolled in Medicaid

	Group I		Group II		Group III		Group IV	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Years in Practice	17	10	25	7	19	12	20	16
Patient Population	477	268	509	246	387	282	512	334
Percent Increase In Cases	8	3	8	3	9	2	7	4
Full Treatment Fee								
Adult	5,463	536	5255	607	5,067	496	4,968	886
Child	5,058	418	4,862	446	4,883	488	4,518	405

Table II. Comparison Of Average Per Case Profit / Loss Assuming a 2 Year Contract for a Patient Enrolled in Medicaid for Each Group Before (Fixed + Variable Costs) and After (Variable Cost Only) the Break-even Point has been reached.

	Group I	Group II	Group III	Group IV
	Mean	Mean	Mean	Mean
Cost of Treatment				
Fixed	1,648	1,760	1,641	1,515
Variable	1,037	663	624	805
Total	2,685	2,423	2,265	2,320
Before Break-Even Point				
Profit Per Case	-164	98	256	201
After Break-Even Point				
Profit Per case	1,484	1,858	1,897	1,716

Table III. Analysis of Break-even Points and Profit Margins after 5% Inclusion of Patients Enrolled in Medicaid for Groups 1-4 for 2005 adjusting Costs and Fees for a 1 Year Period:

	Break-Even Point (# of Patients)	Average Number of Patients	Average.Fee Per Patient	Total of All Costs	Total Revenue	Total Profit
Before Inclusion of Medicaid Patients						
Group 1	203	477	2,446	640,309	1,166,742	526,433
Group 2	220	509	2,361	616,820	1,201,749	584,929
Group 3	158	387	2,320	438,529	897,840	459,311
Group 4	234	512	2,074	594,330	1,061,888	467,558
After Inclusion of Medicaid Patients						
Group 1	210	501	2,389	652,765	1,196,889	544,124
Group 2	226	531	2,311	624,124	1,227,141	603,017
Group 3	160	398	2,290	441,961	911,420	469,459
Group 4	N/A	N/A	N/A	N/A	N/A	N/A