



A comparison of Medicaid reimbursement for non-definitive pediatric dental treatment in the emergency room versus periodic preventive care

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Abstract

Purpose: This study compared the expenditure by the state Medicaid program for episodic, nondefinitive care provided through the emergency room (ER) of a children's hospital with the cost to Medicaid of covering that same child with the recommended preventive service calculated on the fee schedule of the state dental Medicaid program.

Methods: Records of patients discharged from the ER during 1996-1998 who had a payor source of Medicaid were reviewed and the reimbursement amount determined. This was compared to an estimate of preventive services which would have been reimbursed by Medicaid for each child.

Results: During 1996-1998, 97 patients made 102 visits to the ER. Of these, 9 were admitted to the hospital for treatment. The reimbursement amounts for patients admitted to the hospital were ten times greater than the anticipated amount for preventive care. The reimbursement amounts for preventive services was approximately three times more costly than outpatient treatment in the ER for symptoms related to dental caries.

Conclusions: Greater expenditures by the state Medicaid program for treatment in the ER as compared to the cost to Medicaid for providing routine, preventive care depended on whether the child was treated as an inpatient or outpatient. (*Pediatr Dent* 22:463-468, 2000)

The same metamorphosis seen in the hospital emergency room (ER) from a place for treatment of medical trauma to a primary care source is occurring in dentistry. Studies of outpatient ER dental visits report that 40-65% were for nontraumatic dental emergencies, and the primary diagnoses were dental caries and abscess due to dental caries.¹⁻⁴

Examination of charges associated with use of the ER for management of nontraumatic dental disease was the purpose of 2 recent investigations. Ettelbrick et al. developed and tested a model in 5 children's hospitals across the US to identify charges associated with inpatient admission for dental disease.⁵ The median charge per inpatient admission in 1997 for the five hospitals was \$3,223, and the total charges for all 52 admissions were \$270,202.⁵ Graham et al used the same model to assess patient treatment and associated charges for outpatient

use of the ER for nontraumatic dental disease at Children's Medical Center in Dallas, Texas.⁶ Charges ranged from \$40 to \$900 for nondefinitive care in 1997.⁶

Many of the patients seeking emergency room-based dental care rely on federal or state funded payment programs such as Medicaid.^{7,8} The charges associated with management of dental disease in this expensive setting are extremely high and difficult to justify considering that dental caries is a disease which may be prevented. It is well documented that the available number of Medicaid providers has continued to be insufficient to meet the health needs of patients since the advent of Medicaid in 1965.⁹ As a result, visits to the emergency room by Medicaid recipients for nonemergency problems are common.⁹ Waiting until the disease is sufficiently advanced to cause symptoms which drive families to emergency rooms to seek care for their children results in far more costly, less definitive care and is an inappropriate use of federal and state funds.

The evidence is overwhelming that not only is it possible to raise a decay-free generation of young people, but also that it is actually happening for millions of children from higher socioeconomic families. The epidemiology of dental caries in this country is indicative of the effectiveness of early and regular preventive care. The 20% of children who demonstrate 80% of the decay live in low income, underserved families.¹⁰ These children are less likely to receive dental care of any kind including regular, early preventive visits.¹⁰

The educational and therapeutic components of an effective preventive program are not costly, but must be implemented in a regular manner. The American Academy of Pediatric Dentistry (AAPD) recommends that the first visit be at 12 months of age and at 6 month intervals thereafter, or as indicated by the individual patient's needs/susceptibility to disease.¹¹ In addition to plaque removal, oral examination, fluoride treatments and parental and patient education, certain procedures such as radiographs and sealants are recommended at specified times.¹¹ Using a model based on the recommendation of the AAPD and the fee schedule of the state Medicaid program, a total cost to provide these services for a single individual could be calculated, assuming that the individual

Received March 25, 2000 Revision Accepted September 20, 2000

remained covered by the Medicaid program for the first 18 years of life.

Comparative data showing the cost effectiveness of regular and frequent preventive care compared with the expenditure associated with ER management of dental caries related visits could help convince policy makers to improve programs to insure that all eligible children participate. Therefore the purpose of this investigation was to compare the expenditure by the state Medicaid program for episodic, nondefinitive care provided through the emergency room of a children's hospital in response to symptoms of existing dental disease with the cost of covering that same child with the recommended preventive services calculated on the fee schedule of the state dental Medicaid program.

Methods

The sample consisted of patients who were seen for nontraumatic dental disease at the Emergency Referral Center at Children's Medical Center of Dallas, Texas, during a three year period (1996-1998) with a payor source of Medicaid. Patients who were treated as outpatients, as well as those who were admitted to the hospital, were accepted for this investigation.

The model developed by Ettelbrick for collecting financial information relating to hospital charges for dental treatment was used to collect the data.⁶ The model consisted of four steps. First, permission was obtained from the hospital to conduct the study. Second, a computer search, based on the International Classification of Disease (Ninth Revision) Clinical Modification (ICD-9 CM), was used to identify the charts of patients who had been seen in the emergency room with the following primary diagnosis codes: 521.0 (dental caries), 522.5 (periapical abscess without sinus), 682.0 (facial cellulitis), 522.7 (periapical abscess with sinus). The list of patients that was generated from this computer search also indicated the payor source, and only patients having listed Medicaid as a payor source were included in this investigation. Third, a review of the medical records of the sample identified was completed. The following data were collected: age, date of service, final diagnosis code, treatment rendered including lab tests ordered, medications given or prescribed and any dental referrals or consultations that were done.

Finally, the hospital financial record for this group of patients was obtained, and the amount the hospital charged and the amount the hospital was reimbursed by Medicaid were

Table 1. Estimated Medicaid Reimbursement Amounts for Routine Preventive Care

Age (in years)	Procedures performed	Amount (dollars/ visit)	Cumul. total spent per age
1.0	Init. Ex	15.25	15.25
1.5	Ex	10.00	25.25
2.0	Ex, Cpx, Fl	53.75	79.00
2.5	Ex, Cpx, Fl	53.75	132.75
3.0	Ex, Cpx, Fl	53.75	186.50
3.5	Ex, Cpx, Fl	53.75	240.25
4.0	Ex, Cpx, Fl	53.75	294.00
4.5	Ex, Cpx, Fl	53.75	347.75
5.0	Ex, Cpx, Bw	63.75	411.50
5.5	Ex, Cpx, Fl	53.75	465.25
6.0	Ex, Cpx, Fl, S1, Pan	143.75	609.00
6.5	Ex, Cpx, Fl	53.75	662.75
7.0	Ex, Cpx, Fl	53.75	716.50
7.5	Ex, Cpx	53.75	770.25
8.0	Ex, Cpx, Fl, Bw	63.75	834.00
8.5	Ex, Cpx, Fl	53.75	887.75
9.0	Ex, Cpx, Fl	53.75	941.50
9.5	Ex, Cpx, Fl, Bw	63.75	1,005.25
10.0	Ex, Cpx, Fl	53.75	1,059.00
10.5	Ex, Cpx, Fl	53.75	1,112.75
11.0	Ex, Cpx, Fl, Bw	63.75	1,176.50
11.5	Ex, Cpx, Fl	53.75	1,230.25
12.0	Ex, Cpx, Fl, S2, Pan	143.75	1,374.00
12.5	Ex, Cpx, Fl, Bw	63.75	1,437.75
13.0	Ex, Apx, Fl	69.25	1,507.00
13.5	Ex, Apx, Fl	69.25	1,576.25
14.0	Ex, Apx, Fl, Bw	79.25	1,655.50
14.5	Ex, Apx, Fl	69.25	1,724.75
15.0	Ex, Apx, Fl	69.25	1,794.00
15.5	Ex, Apx, Fl, Bw	79.25	1,873.25
16.0	Ex, Apx, Fl	69.25	1,942.50
16.5	Ex, Apx	69.25	2,001.75
17.0	Ex, Apx, Fl, Bw	79.25	2,091.00
17.5	Ex, Apx, Fl	69.25	2,160.25
18.0	Ex, Apx, Fl	69.25	2,229.50

Init Ex = Initial Exam
Bw = 2 Bitewing radiographs
Cpx = Child prophylaxis

Ex = Periodic Exam
Pan = Panoramic radiograph
Apx = Adult prophylaxis

Fl = Fluoride
S1 = Sealants on 6 yr. molars
S2 = Sealants on 12 yr. molars

determined. Total hospital charges and reimbursements were calculated from charges and reimbursements for the facility, pharmacy and physician. Facility charges and reimbursements included charges for all tests ordered and charges for level of nursing care required. Pharmacy charges and reimbursements included medications given at the hospital. Emergency room physician charges are based on the complexity of the type of

Table 2. Patient Distribution by Year of Treatment for Age and Type of Admission

Age	1996 (N=7)		1997 (N=46)		1998 (N=44)		Total (N=97)	
	Outpt (N=6)	Inpt (N=1)	Outpt (N=38)	Inpt (N=8)	Outpt (N=44)	Inpt (N=0)	Outpt (N=88)	Inpt (N=9)
Birth-3	2	1	9	1	8	0	18	3
4-6	3	0	15	4	15	0	32	5
7-12	1	0	10	2	17	0	28	2
13-18	0	0	4	1	4	0	8	1

patient seen using Current Procedure Terminology Codes (CPT) 99281- 99285. Most ER visits for nontraumatic preventable dental disease would be assigned a CPT code of 99282. Physician charges and reimbursements are separate from hospital charges, and these records were not able to be obtained; however, the physician charges and reimbursement amounts were estimated with assistance from personnel at the financial office at Children's Medical Center of Dallas, Texas.

An estimate of preventive services which would have been reimbursed by Medicaid up until the age the child was seen in the ER for nontraumatic dental disease was made for each child. It was developed using the AAPD recommendations (beginning with the first visit at 12 months of age, assuming a six-month periodicity, and providing radiographs and fluoride treatments at specified intervals) and the Texas Medicaid fee schedule for 1998.^{11,12} A cumulative treatment/fee profile by age of patient was created to determine reimbursements, and it is shown in Table 1.

Results

Ninety-seven patients with Medicaid as a payor source made a total of 102 emergency room visits to the Emergency Referral Center at Children's Medical Center of Dallas for nontraumatic dental disease during a three-year period (1996-1998). Of the 97 patients, 7 visited the ER in 1996, 46 were seen in 1997, and 44 were seen in 1998. A total of 9 patients were treated as inpatients and 88 as outpatients. Patient ages ranged from 1 to 17 yrs and the average age was 6 yrs. Patient visits are summarized by year for age and admission type in Table 2. The primary ICD-9 codes identified for non-traumatic preventable dental disease were 522.5 or periapical abscess (44%), 521.0 or dental caries (40%), and 682.2 or facial cellulitis (11%). The other 5% were diagnosed as having tooth developmental/eruption problems, abnormal hard tissue/pulpal problems or a dental disorder that was otherwise not specified. The breakdown of specific diagnosis codes is shown in Table 3. Treatment rendered and subsequent charges for these patients differed depending on whether the patients were inpatients or outpatients. In 1996, one patient was treated as an inpatient with a hospital charge of \$2,357, while outpatient charges ranged from \$233-\$2,357, with a median charge of \$398. In 1997, inpatient hospital charges ranged from \$2,215-\$43,907 with a median charge of \$3,787, while outpatient charges ranged from \$175-\$1,073, with a median charge of \$235. In 1998, there were no admis-

sions from this study population, while outpatient charges ranged from \$178-\$1,161, with a median charge of \$226. Total hospital charges over the 3 years associated with treatment for inpatients was \$100,056 and for outpatients was \$33,303. None of the amounts used to calculate total hospital charges were for definitive dental treatment. These findings are summarized by year and patient type in Table 4.

Table 5 summarizes a comparison of the ranges, mean, median and total Medicaid reimbursements for ER treatment of outpatients with reimbursements for preventive services for these same patients. In 1996, six patients were treated as outpatients. Hospital reimbursement by Medicaid ranged from \$120-\$1,733, with a median reimbursement of \$171. Preventive care for the same group of patients would have ranged from \$79-\$770, with a median of \$240. For 1997 the 43 patients treated as outpatients represented hospital reimbursements that ranged from \$81-\$636, with a median of \$143. The same year preventive care would have cost the Medicaid system \$15-\$2,160, with a median of \$412. Outpatient care ranged from \$93-\$848, with a median of \$131 in 1998. Preventive care in the same year would have ranged from \$25-\$2,160, with a median of \$716. Comparing the medians and totals, it is approximately three times more costly to provide preventive services than to provide episodic ER based care for outpatient dental caries related symptoms.

Table 6 summarizes a comparison of the ranges, mean, median and total Medicaid reimbursement for inpatients with the reimbursement for preventive services for these same patients. In 1996, one patient was treated as an inpatient at a cost of \$1,733. The cost to Medicaid for the same patient to provide routine, preventive care would have been \$79. In 1997, eight patients were admitted with reimbursements that ranged from \$1,149-\$23,056, with a median of \$2,671. During the same year, preventive care for this group of patients would have ranged from \$187-\$1,943, with a median of \$412.

Table 3. ICD-9 Codes of Emergency Room Patient Visits at Admission

ICD-9 Code	Description	1996 (N=7)	1997 (N=51)	1998 (N=44)	Total (N=102)
521.0	Dental caries	0	14	27	41
522.5	Periapical abscess	7	27	11	45
682.0	Facial cellulitis	0	5	6	11
522.9	Dental disorder nos	0	2	0	2
522.3	Abnhard tiss-tooth pulp	0	2	0	2
520.8	Tooth deve/Erupt pbx (problems)	0	1	0	1

nos = nonspecific

Table 4. Hospital Charges Associated with Treatment and Medicaid Reimbursement in Dollars

Year	1996 N=7		1997 N=51		1998 N=44		Total N=102	
	Outpatient N=6	Inpatient N=1	Outpatient N=43	Inpatient N=8	Outpatient N=44	Inpatient N=0	Outpatient N=93	Inpatient N=9
Hospital Charge Range	233-2,357	2,357	175-1,073	2,125-43,907	178-1,161	0	175-2,357	2,125-43,907
Medicaid Reimbursed Range	120-1,733	1,733	81-636	1,149-23,056	93-848	0	81-1,733	1,149-23,056
Mean Hospital Charge	687	2,357	398	12,212	273	0	358	11,157
Mean Medicaid Reimbursed	467	1,733	257	7,093	174	0	231	6,498
Median Hospital Charge	307	2,357	235	3,787	226	0	235	3,637
Median Medicaid Reimbursed	171	1,733	143	2,671	131	0	149	2,031
Total Hospital Charge	4,124	2,357	17,130	97,699	12,049	0	33,303	100,056
Total Medicaid Reimbursed	2,806	1,733	11,063	56,749	7,679	0	21,548	58,482

There were no patients admitted in 1998. Comparing the medians and totals, it is approximately 10 times more costly to manage dental caries related symptoms on an inpatient basis than to provide preventive dental care for these same patients.

Referral status varied greatly among patients. Approximately 59% were referred to the CMC Dental Clinic and 30% of the patients were referred to private practice. A referral to a dentist in private practice consisted of giving the patient a list of pediatric dentists in the surrounding communities, but there was no documentation to indicate that these referrals were followed. For the remainder of the patients (11%), no referral was listed. There was also a large variation in the number of dental consultations obtained, either in person or by telephone, during the ER visits. Pediatric dental residents were consulted on 31% of the visits. For a majority of the ER visits (69%), no dental consult was requested.

Discussion

This study was undertaken with the assumption that preventive dental care would be less costly to the Medicaid system than hospital-based episodic emergency care. This was true for children who required inpatient admission to manage the sequelae of dental disease. The charges were approximately 10 times higher to provide inpatient care for dental caries related symptoms than to have provided that same patient with the recommended periodic preventive care. However, for children who were treated as outpatients, the estimated preventive charges were 3 times more than charges incurred when they were treated in the emergency room. Policy makers who do not understand the difference in the medical model for treatment of disease and the dental model for treatment of dental disease may, at first glance, assume the hospital based care to be better use of federal and state dollars. The care provided through the hospital ER is based on the medical model for the treatment of infections. In medicine, infections are treated with

antibiotics which are expected to eradicate the organisms causing the infection. Once these organisms are eliminated, the infection subsides. Antibiotics given for dental infections only treat the symptoms of dental caries. The causative agent is the carious tooth which must be treated surgically to remove the source of infection. Therefore, providing antibiotics in the emergency room was not a definitive cure for dental infections. Additional treatment in the form of extraction or management of dental caries will be needed, and these charges will be in addition to the emergency room charges found in this study. This would be necessary to factor in if policy makers were to use this data for allocation of Medicaid funds.

Policy makers also need to understand the long range implications of early, regular, effective preventive care. The provision of preventive dental services which maintain a child's mouth that is free of dental disease will have an impact on the need for future dental care. Dental caries is mostly a disease of childhood, and childhood caries is predictive of adult caries. Once a caries-free pattern is established in a child, he/she will likely be caries free through adulthood, and there will be less need for future dental restorations in the adult. The types of dental restorations required to rehabilitate the adult dentition are costly, and one may assume that preventive care for children would result in less expenditures for dental care in persons over the age of 18. Ultimately, dollars invested in childhood preventive dental care will equal dollars saved in maintaining the adult dentition.

A curious finding was that there were no inpatient admissions in 1998. It would be expected that, with approximately the same number of patients seen as in 1997, that the number of patients who were admitted to treat the sequelae of nontraumatic preventable dental disease would be similar. To confirm this result, the original data was rechecked. In addition, a new computer search was performed, which yielded the same result. The lack of inpatient admissions found for 1998 could be due to the fact that there actually were no inpatients

Table 5. A Comparison of Medicaid Reimbursement for ER Treatment of Outpatients Vs. Medicaid Reimbursement for Preventive Treatment for the Same Patients

Year	1996 N=6		1997 N=43		1998 N=44		Total N=93	
Tx Type	Hospital	Prev	Hospital	Prev	Hospital	Prev	Hospital	Prev
Range	120-1,733	79-770	81-636	15-2,160	93-848	25-2,160	81-1,733	15-2,160
Mean	467	405	257	614	174	788	231	682
Median	171	240	143	412	131	716	149	465
Total	2,806	2,430	11,063	26,390	7,679	34,683	21,548	63,503

Table 6. A Comparison of Medicaid Reimbursement for Inpatient ER Treatment Vs. Preventive Treatment

Year	1996 N=1		1997 N=8		1998 N=0		Total N=9	
Tx Type	Hospital	Prev	Hospital	Prev	Hospital	Prev	Hospital	Prev
Range	1,733	79	1,149-23,056	187-1,942	0	0	1,149-23,506	79-1,942
Mean	1,733	79	7,093	733	0	0	6,498	660
Median	1,733	79	2,671	412	0	0	2,031	412
Total	1,733	79	56,749	5,868	0	0	58,482	5,947

admitted for nontraumatic dental disease during that year or there could be some flaw in the method used to find this data.

This investigation did not intend to examine the appropriateness of the treatment provided in the hospital for either inpatients or outpatients. However, Graham et al analyzed treatment rendered by ER physicians for the dental problems presenting as outpatients in 1997 at the Emergency Referral Center at Children's Medical Center of Dallas, Dallas, Texas. They found that most patients were treated empirically according to their presenting signs and symptoms. They noted that the majority of visits provided no definitive services. Most visits consisted of interventions such as making assessments, administering a prescription for antibiotics, and providing a dental referral, which could have been provided more cost effectively and definitively in the dental setting.⁶

One disturbing finding in this investigation was the apparent lack of follow-up on dental referrals to determine whether the offending tooth/teeth were treated. Without definitive treatment for the offending tooth/teeth there is no assurance that the child will not return to the ER and possibly require a more costly admission to manage the sequelae of untreated dental disease. Additionally, a review of the charts revealed that pediatric dental residents were consulted in only 31% of the cases. If this had occurred in a greater percentage of the patients, the antibiotics and treatment rendered in the ER may have been different. Had the pediatric dental resident been consulted when the child was in the ER, definitive treatment may have been rendered at that visit.

In designing this study, it was assumed that patients who rely on Medicaid for dental care do not have a primary dental provider. Thus, they would be more likely to utilize the ER for treatment. However, in this study, only approximately 25% of the patients seen in the ER for dental problems were covered by Medicaid. This may be due to several reasons: there may be some children who are not receiving care at all; there may be more dental providers than assumed; or some of the non-Medicaid children were Medicaid eligible but not enrolled.

Determination of previous dental care was not routinely found on chart review. This is information that should be asked of every patient that presents for emergency care. It is important to know this to determine if the child has past experiences that would impact behavior, if there is an established relationship with a dentist so that proper referral can be made or if there is a pattern of dental neglect. Noting this information would also help in determining if follow up care was completed.

In summary, Medicaid reimbursement for treatment provided through the hospital ER was less costly than preventive care if the child was treated as an outpatient. However, without definitive treatment of the dental caries, these dollars appear to have been used very ineffectively. Policy makers who use bottom-line dollars to assess value for money need to understand that they are meaningless without understanding the model for delivering effective treatment of the disease at hand—in this case dental caries.

Conclusions

Analysis of ER admissions at Children's Medical Center of Dallas over a three year period demonstrated:

1. It is approximately three times more costly to provide preventive services than to provide episodic ER based care for outpatient dental caries related symptoms.
2. It is approximately 10 times more costly to manage dental caries related symptoms on an inpatient basis than to provide preventive dental care for these same patients.

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