Medicaid Costs Associated with the Hospitalization of Young Children for Restorative Dental Treatment Under General Anesthesia

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Abstract

Objective: This paper examines the cost to the Iowa Medicaid program of hospitalizing young children for restorative dental care under general anesthesia, and describes the dental services received in this setting. **Methods:** Medicaid dental claims for young children receiving restorative dental care under general anesthesia during fiscal year 1994 were matched with corresponding hospital and anesthesia claims. **Results:** The total cost to the Medicaid program of treating a child in the hospital under general anesthesia was \$2,009 per case. Less than 2 percent of Medicaid-enrolled children under 6 years of age who received any dental service accounted for 25 percent of all dollars spent on dental services for this age group, including hospital and anesthesia care. The most frequent type of procedure was stainless steel crowns (SSCs), with an average of almost six per case. **Conclusions:** Early identification, prevention, and intervention are critically important to prevent the costly treatment of children with ECC in hospital operating rooms. [J Public Health Dent 2000;60(1):28-32]

Key Words: Medicaid, child, early childhood caries, baby bottle tooth decay, general anesthesia, cost, hospital.

One of the most devastating forms of dental disease to affect children is early childhood caries (ECC). Proceedings from a recent national conference on ECC provide a thorough review of the biological mechanisms (1) and behavioral issues (2) associated with this disease. The prevalence of ECC in this country is estimated to be approximately 5 percent for the general population, and 20 percent to 75 percent for certain high-risk groups (3). Due to the young age of children affected by ECC and their extensive treatment needs, the restorative treatment often is provided in an operating room environment under general anesthesia. The majority of these cases do not require an overnight hospital stay; however, treatment under these conditions still adds considerably to the cost of treatment, with payment coming from a variety of sources including public insurance (primarily Medicaid), private insurance, and private pay (out of pocket).

A review of early reports of the costs associated with hospitalizing children for treatment reported an estimated cost per child of \$1,000 for the hospitalization and \$700 to \$1,000 for the dental treatment (4). Others have indicated that the costs of treating ECC have increased significantly since this earlier report (5). A recent publication discussing ECC treatment costs in northern California found that the costs associated with treatment under general anesthesia were related to the time in the operating room and generally ranged from \$1,200 to \$2,600, in addition to the costs of the dental treatment (6).

Because ECC is most prevalent among low-income children and because many of these children are enrolled in Medicaid, much of the cost of treating children with ECC is undoubtedly borne by the Medicaid program. To date, however, the cost to the Medicaid program of this type of treatment is not documented in the literature. The purpose of this paper is to examine the cost to the Iowa Medicaid program of hospitalizing young children for restorative dental care under general anesthesia, and to describe the dental services received in this setting.

Methods

Iowa Medicaid eligibility and claims files for fiscal year 1994 (FY 1994) were used to evaluate the number of children under age 6 years who received dental treatment in a hospital operating room and the dental care associated with this treatment. Only children under the age of 6 who became eligible for Medicaid through the Aid to Families with Dependent Children (AFDC) program or AFDCrelated programs (not including children eligible through the Supplemental Security Income—SSI or medically needy programs) were included in these analyses. These inclusion criteria were used to select only cases that received their dental treatment under general anesthesia because of age and caries status and not because of a compromising medical condition.

Medicaid enrollment files were used to determine the age of each child and the number of months each recipient was enrolled in Medicaid during the year. A child's age was categorized according to the age the child had turned during FY 1994. For example, a child who had his or her second birthday during FY 1994 was considered to be 2 years old.

A multistep decision rule process was used to determine which children received care in a hospital operating room for early childhood caries during FY 1994. First, all hospital claims with

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a primary diagnosis of dental caries (ICD-9 code 521.0) were selected. The dental care provided at each hospital visit was then matched to the hospital claim using the recipient ID number and the date of service. Cases with multiple-day hospital stays were excluded from the study because they likely reflected dental treatment provided to children with complicated underlying medical conditions. Dental services, by DPT code, that were included in this analysis are presented in Table 1. Lastly, these services were matched with corresponding anesthesia claims. Linking to the anesthesia claims both validated that these cases were conducted in a hospital operating room (and not in a hospital-based dental clinic) and added the costs of the anesthesia to these cases. The dental procedures received by each child were then linked together by recipient ID number to determine the unduplicated number of children and the care they received while enrolled in Medicaid during FY 1994.

The unduplicated number of children and their associated dental care were used as the numerator when determining rates of dental services. The denominator for calculating rates of services (i.e., the number who possibly could have received services in the year) was more difficult to determine due to the transient or partial-year enrollment of many Medicaid recipients. For example, only 52 percent of Iowa Medicaid recipients under age 6 years were enrolled for all 12 months of FY 1994. To account for different lengths of enrollment, rates of dental services were calculated using two different measures of the number of enrollees. The first measure was a simple tally of the total number of children in each age category who were enrolled at some point during FY 1994 (number of enrollees). The second method calculated the number of enrolled children in full-time equivalents (number of FTEs). To calculate FTEs, the number of months each child was enrolled in Medicaid during FY 1994 was determined. For each individual, this number varied from one to 12 months. The total number of enrolled months was then summed across all individuals and divided by 12 to get the number of enrolled years, or FTEs enrolled in Medicaid.

The costs presented in this paper are the charges allowed and reimbursable

by Medicaid (the allowed charges). Allowed charges represent the closest figures available to what the cost of the care was to the Medicaid program. However, they slightly overestimate the costs to the program because they represent Medicaid's liability prior to any other third party coverage being paid. Descriptive analyses of hospital operating room-based dental care provided under general anesthesia presented in this paper include the number of children who received any dental services in a hospital operating room during FY 1994; the dentists', hospital, and anesthesiologists' Medicaid allowed charges; a comparison of the average dentist's submitted charges compared to the dentists' average allowed charges; and the average number of procedures by service category. All results are presented by age category of the enrollee.

Results

Table 2 presents Medicaid enrollment information and the number who received at least one dental service during FY 1994. During FY 1994, 64,358 children under age 6 years were enrolled in Medicaid through the AFDC and AFDC-related programs. When enrollment was calculated in terms of full-time equivalents, total Medicaid enrollment decreased on average by about 20 percent, or the equivalent of 16,172 enrollees. For children under age 1 year, however, the decrease was closer to 50 percent, primarily because of children being born at different times throughout the year.

On average, just fewer than onequarter of all Medicaid-enrolled children under age 6 (31% of FTEs) received any dental services during FY 1994 (Table 2). The percentage receiving dental care was particularly low for children under age 3 years. Utilization increased significantly by the time children were 5 years old when almost 60 percent of children (70% of FTEs) had made a dental visit during the year. The total cost for all the dental care in this age group not provided in a hospital operating room during FY 1994 was \$1.56 million (in allowed charges). The average cost per child for these children not treated in a hospital operating room (in allowed charges) was \$105. A more detailed description of the general dental utilization of this Medicaid population can be found in Kanellis et al. (7).

TABLE 1 Dental Procedures Used in Analyses by Category Type

	DPT
Procedure	Code
Diagnostic/preventive	
Initial exam	00110
Periodic (recall) exam	00120
Emergency exam	00130
Full mouth series	00210
PA 1st	00220
Additional PAs	00230
Occlusal	00240
Single BW	00270
2 BW	00272
4 BW	00274
Panoramic x-ray	00330
Child prophy	01120
Child prophy & fluoride	01201
Sealant per tooth	01351
Amalgam restorations	
1S—primary	02110
25—primary	02120
3S—primary	02130
4S—primary	02131
1S—permanent	02140
2S—permanent	02150
3S—permanent	02160
4S—permanent	02161
Composite restorations	
1S anterior	02330
2S anterior	02331
3S anterior	02332
4S anterior	02335
1S post-prim	02380
1S post-perm	02385
Stainless steel crowns	
Primary	02930
100th extractions	07110
Single tooth	0/110
Additional tooth	07120
ruipotomy	03220

Regarding the hospital operating room-based dental care specifically, 272 Medicaid-enrolled children under age 6 years received dental care in a hospital operating room under general anesthesia during FY 1994 (Table 3). This represented 0.4 percent of the 64,358 children enrolled at some point during the year (0.6% of FTEs). The number of cases varied significantly by age. The largest number of cases consisted of 2-year-olds, with the number gradually declining with age. Although the actual number of cases is small, one out of every 11 2-year-old children and one in every 25 1-yearold children who received any dental care received at least some of it in the operating room. No child younger than age 1 received treatment for dental caries in an operating room.

The total cost (in allowed charges) for this care (including the hospital, dental, and anesthesia) was \$546,333, an average of \$2,009 per case. Allowed charges broken out by hospital, dentist, and anesthesia costs are shown in Table 4. Sixty-two percent of the allowed charges for this care were for the hospital costs, 22 percent for the dentist's care, and 16 percent for the anesthesia care. Although the largest costs were for 2-year-olds (the age category with the most cases), the average total allowed charges per case increased with age.

The dentists' average charge per case (what they requested from Medicaid) and average allowed charges per case (what Medicaid would pay) are shown in Table 5. The dentists' average charge was \$755 per case with an average allowed charge of \$444, or 59 percent of charges. The largest average dentists' charges per case were for children age 4 (average charge of \$938 and allowed charge of \$577).

Table 6 shows the average number of procedures provided in each case. The most frequent type of procedures were stainless steel crowns (SSCs), with an average of almost six per case. The number of SSCs per case increased significantly with age. The number of pulpotomies also increased significantly with age, with an average of over five pulpotomies being provided per 4-year-old child. The number of composite restorations declined with age.

Discussion

Among all children under 6 years of age enrolled in the Iowa Medicaid program in FY 1994, \$2.1 million in allowed charges were incurred for dental care including associated hospital and anesthesia charges. The 272 children with early childhood caries who received dental care in the hospital operating room under general anesthesia used about one-fourth (\$546,333) of these resources. This finding indicates that fewer than 2 percent of the children under 6 years of age who received a dental service accounted for

 TABLE 2

 Dental Utilization and Medicaid Enrollment for Children under 6 Years of Age,

 by Age, FY 1994

Age (Years)	Number Enrolled	Number of FTEs	Number Receiving Any Dental Service	Percent Enrollees Receiving Dental Service	Percent FTEs Receiving Dental Service
<1	9,885	4,429	80	1	2
1	13,009	10,245	452	3	4
2	11,314	9,085	1,195	11	13
3	10,772	8,681	3,046	28	35
4	10,200	8,242	4,883	48	59
5	9,178	7,504	5,233	57	70
Total	64,358	48,186	14,889	23	31

TABLE 3 Medicaid-enrolled Children Under Age 6 Years Receiving Dental Care in an Operating Room (OR), by Age, FY 1994

Age (Years)	Number Treated in OR	Percent Enrollees Treated in OR	Percent FTEs Treated in OR	Percent Children with Dental Visit Treated in OR
<1	0	0.0	0.0	0.0
1	18	0.1	0.2	4.0
2	105	0.9	1.2	8.8
3	77	0.7	0.9	2.5
4	47	0.5	0.6	1.0
5	25	0.3	0.3	0.5
Total	272	0.4	0.6	1.8

TABLE 4

Cost (Allowed Charges) for Hospital, Dental, and Anesthesia Services by Age, FY 1994

		A	llowed Charges	(\$)				
Age (Years)	Hospital	Dentist	Anesthesia	Total	Average Total/Case			
1	17,739	5,713	5,190	28,642	1,591			
2	125,471	40,594	32,457	198,522	1,891			
3	97,667	34,998	25,227	157,892	2,051			
4	60,862	27,128	15,919	103,909	2,211			
5	37,378	12,227	7,763	57,368	2,295			
Total	339,117	120,660	86,556	546,333	2,009			

25 percent of all dollars spent on dental services, including hospital and anesthesia care. Excluding the hospital and anesthesia costs, this high-risk group accounted for 8 percent of all dollars spent on dentists' services for children in this age group.

Although the largest total allowed charges were found for 2-year-olds, the age category with the most cases,

TABLE 5	
Dentists' Average Charges and Allowed Charges per Cas	se by Age, FY 1994

Age (Years)	Number Treated in Operating Room	Average Dentists' Charge/Case (\$)	Average Dentists' Allowed Charge/Case (\$)	Percent Dentists' Charges Allowed
1	18	521	317	61
2	105	677	387	57
3	77	799	455	57
4	47	938	577	62
5	25	774	489	63
Total	272	755	444	59

 TABLE 6

 Average Number of Dental Procedures per Case by Service Category and Age,

 FY 1994

Age (Years)	Stainless Steel Crowns	Amalgam Fillings	Composite Fillings	Pulpo- tomies	Extractions	Preventive Services
1	5.39	2.11	2.83	0.61	1.33	2.06
2	5.53	3.70	2.50	1.69	0.97	2.43
3	5.57	4.06	2.43	2.42	1.22	2.09
4	6.87	3.55	2.47	5.15	1.51	2.00
5	7.52	3.12	0.92	2.52	1.92	1.96
Total	5.95	3.62	2.35	2.50	1.25	2.19

the average total allowed charge increased with age. Two-year-olds were the most likely to have received dental care in the operating room, probably due in part to needs related to the inappropriate use of the baby bottle. Average costs for operating room dental care increased with age, perhaps because of increased treatment needs resulting from having more teeth at risk for decay for a longer period of time. Older children would have worse oral health problems, or more teeth with decay, at the time of their visit. Five-year-olds received the most SSCs per case and 4-year-olds received the most pulpotomies per case, two additional indicators of case severity.

In this study, the average cost to the Medicaid program for each young child treated in the operating room was approximately \$2,000. This estimate is slightly higher than the estimates made by Kelly and Bruerd (4) almost a decade earlier, but generally lower than that reported more recently by Ramos-Gomez et al. (6) for California. It is important to remember, however, that the costs reported in the current study reflect Medicaid's allowed charges, not what was actually billed by the dentist, anesthesiologist, or hospital. Had Medicaid paid the total charges, the cost per child would have been higher.

As reported, the allowed dental charges in this study were only 59 percent of the fees actually charged by the dentist. This estimate might underrepresent the difference between private dentists' charges and Medicaid payments because some dentists only submit a bill for what Medicaid will pay to make their accounting easier.

The procedures completed on these children are consistent with their being in poor oral health. Other than preventive services, the most commonly provided procedures in the operating room were for significant decay and the restoration of the diseased teeth (pulpotomies, tooth extractions, stainless steel crowns, and amalgam and composite restorations).

It is unclear how these findings in Iowa would compare with those from other states. The cost to Medicaid of providing dental treatment for ECC in the operating room in other states could differ significantly from our findings, depending on a number of factors. Possible factors include: (1) the number of young Medicaid-enrolled children, (2) the number of children from ethnic and cultural groups known to have high rates of dental decay, (3) the number and distribution of dentists providing treatment under general anesthesia, and (4) varying Medicaid reimbursement rates.

Although the rationale for children making their first visit to the dentist by age 1 is well established (8), only 3 percent of Medicaid-enrolled 1-yearold children in the current study received any dental service. This finding is due likely to a combination of factors, including lack of perceived need on the part of parents and limited availability of dentists willing to see Medicaid-enrolled patients as young as 1 year of age. The findings of this study suggest that early intervention and prevention are especially critical for low-income and other high-risk populations, and that efforts should be made to increase the number of highrisk children who receive dental screening, prevention, and referral for definitive treatment at an early age.

As revealed by the current study, however, the relatively few children who are using such a large percentage of the resources pose a particularly difficult challenge. Even by shifting significantly more resources into preventive services, including screening and referral, it would be difficult to identify 0.5 percent of the children who are most at risk. Such a shift might also redirect important resources away from treatment services for these low-income children.

Alternative strategies for managing ECC once it is diagnosed also should be explored. If children with ECC can be identified prior to pulpal involvement, medical management or Atraumatic Restorative Treatment (9) might be successful in preventing hospitalization in some cases. Improving our understanding and knowledge of early identification and management of children most at risk is critically important to prevent the very costly treatment of children with early childhood caries in hospital operating rooms.

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