Published in final edited form as:

Paediatr Anaesth. 2010 September ; 20(9): 856–865. doi:10.1111/j.1460-9592.2010.03371.x.

Impact of chronic condition status and severity on dental treatment under general anesthesia for Medicaid-enrolled children in Iowa state

Donald L. Chi, DDS, PhD^{*}, Elizabeth T. Momany, PhD[†], John Neff, MD[‡], Michael P. Jones, PhD[§], John J. Warren, DDS, MS[¶], Rebecca L. Slayton, DDS, PhD^{**}, Karin Weber-Gasparoni, DDS, PhD^{**}, and Peter C. Damiano, DDS, MPH^{†,¶}

^{*}Department of Dental Public Health Sciences, School of Dentistry, University of Washington, Seattle, WA, USA

[†]Public Policy Center, University of Iowa, Iowa City, IA, USA

[‡]Department of Pediatrics and Seattle Children's Hospital, School of Medicine, University of Washington, Seattle, WA, USA

[§]Department of Biostatistics, College of Public Health, University of Iowa, Iowa City, IA, USA

[¶]Department of Preventive and Community Dentistry, College of Dentistry, University of Iowa, Iowa City, IA, USA

^{**}Department of Pediatric Dentistry, College of Dentistry, University of Iowa, Iowa City, IA, USA

Summary

Objective—To assess the impact of chronic condition (CC) status and CC severity, respectively, on the odds of receiving dental treatment under general anesthesia (GA) for Medicaid-enrolled children by age group.

Methods—This was a retrospective analysis of Iowa Medicaid-enrolled children <15 years ($n = 62\,721$) from 2005 to 2008. 3M Clinical Risk Grouping Software identified each child's CC status (yes/no) and assigned children with a CC into a hierarchical CC severity group (episodic/life-long/complex). Multiple variable logistic regression models were used to identify the determinants of dental treatment under GA.

Results—Less than 1% of children received dental treatment under GA. While there was no significant difference in dental treatment under GA by CC status for children <6, those with a life-long CC were twice as likely to receive dental treatment under GA as demographically similar children with an episodic CC ($P < 0.05$). Children ages 6–14 with a CC were three times as likely as those without a CC to receive treatment under GA ($P = 0.001$). There was also a direct relationship between CC severity and dental treatment under GA use for older children. Those living in nonmetropolitan areas were more likely to receive treatment under GA as were children who previously received dental treatment under GA.

Conclusions—Chronic condition status and severity were more important determinants of dental treatment under GA for Medicaid-enrolled children ages 6–14 than for those <6. Understanding these relationships is a critical step in developing clinical strategies and

interventions aimed at preventing dental disease for Medicaid-enrolled children whose reasons for needing dental treatment under GA are modifiable.

Keywords

general anesthesia; dental health services; disabled children; Medicaid

Introduction

Estimates suggest that 20% of children in the United States have a chronic condition (CC), a population for whom dental care is the most common unmet healthcare need (1–3). While most children can be treated in dental office settings, there are subgroups that require treatment under general anesthesia (GA). Indications for oral rehabilitation under GA include extensive treatment needs (e.g., early childhood caries) coupled with uncooperative behavior secondary to young age; acute situational anxiety; or a medical comorbidity (4–6).

The availability of dental treatment under GA is particularly important for children enrolled in Medicaid, a publicly financed health insurance program in the United States for children from low-income households. Research suggests that Medicaid-enrolled children are at increased risk for caries (7). One publication based on National Health and Nutrition Examination Survey III data reported that the proportion of children ages 2–18 with untreated caries was greatest among those in the lowest income group and decreased as household income increased (8). A well-documented factor associated with untreated caries is low utilization of dental care (9,10). Studies have found that as few as one-in-five Medicaid-eligible children in the United States receive preventive dental care (11). This is expected given the numerous barriers to office-based dental care this population encounters (12–17).

While substantial numbers of children have a CC, the extent to which CC status and severity, respectively, are related to dental treatment under GA for Medicaid-enrolled children is poorly understood. Moreover, the potentially heterogeneous effects of CC status and severity on receipt of dental treatment under GA for children of different ages have not been examined. Moreover, a recent study failed to find sufficient evidence to formulate clinical guidelines on the indications for oral rehabilitation under GA (18). This lack of knowledge hampers efforts to design targeted clinical interventions aimed at reducing dental-related hospitalizations for children whose main reasons for needing treatment under GA are modifiable.

Even though Medicaid-enrolled children may be at increased risk for untreated tooth decay, it is hypothesized that the role of CC status and severity as determinants of dental treatment under GA differs based on the age of the child. Use of services under GA for children with early childhood caries (defined by the American Academy of Pediatric Dentistry as affecting children <6 years) may be related more to socioeconomic and behavioral factors (19), whereas CC status and severity may have a greater influence on dental treatment under GA for older children. There is currently no empirical support, however, for these hypotheses.

To address this knowledge gap, the determinants of dental treatment under GA for Medicaid-enrolled children were evaluated separately for those ages <6 and 6–14. The relationships between CC status and severity, respectively, and dental treatment under GA were of primary interest. Using enrollee-level administrative data and a conceptual model on oral health disparities as the theoretical foundation for this study, we tested the hypotheses of no difference in the receipt of dental treatment under GA by CC status and severity for the two age groups.

Methods

Conceptual framework

The theoretical framework for this study was based on an oral health disparities model proposed by Patrick and colleagues (20). The following factors were evaluated as potential determinants of dental treatment under GA: ascribed factors (CC status, CC severity, age, sex, race/ethnicity, Medicaid eligibility program); proximal factors (previous primary medical care use, previous dental care use); immediate factors (whether there was another Medicaid-enrolled sibling or adult in the child's household); intermediate factors (rurality); and distal factors (whether the child lived in a dental Health Professional Shortage Area [HPSA]).

Data

We obtained Medicaid files from calendar years (CYs) 2003 to 2008 under an agreement from the Iowa Department of Human Services. To ensure patient confidentiality, all enrollee-level data were de-identified. The University of Iowa Institutional Review Board approved this study.

The claims files contained all claims from January 1, 2003, to December 31, 2008, submitted by a health care provider on behalf of each Medicaid enrollee as well as a listing of all medical diagnoses by International Classification of Disease, Ninth Revision, Clinical Modification codes. Dental services were identified by five-digit alphanumeric Current Dental Terminology codes.

Study population

Our study focused on children age <15 who were enrolled in the Iowa Medicaid Program for 11–12 months during CY2005 ('baseline' year). In addition, children had to be subsequently enrolled for 11–12 months in each of the following CYs: 2006, 2007, and 2008. The final dataset contained 62 721 enrollees.

Measures

The dependent variable in this study was receipt of dental treatment under GA in CY2006–2008 (Figure 1). We generated this variable by examining each enrollee's inpatient and outpatient files for a three-digit anesthesia department revenue code (370) and an ICD-9-CM dental diagnostic code (520–523) and dental surgical code (23,24).

The main independent variable in this study was CC status, which was defined using the 3M Clinical Risk Grouping (CRG) Software (21,22). The CRG system applies a clinician-designed algorithm to classify children into one of the following nine mutually exclusive, hierarchical core health status risk groups (CHSGs):

1. Healthy.
2. Acute condition.
3. Single minor CC.
4. Minor CC in multiple systems.
5. Single dominant or moderate CC.
6. Significant CC in multiple systems.
7. Dominant CC in three+ organs.
8. Malignant CC.

9. Catastrophic CC.

To identify the effects of having a CC, the first set of analyses were conducted with children classified into one of two groups: (i) those without a CC (CHSGs 1–2) and (ii) those with any CC (CHSGs 3–7 and 9). Children from CHSG 8 ($n = 77$) were excluded because of data sparseness and because children with malignancies are believed to exhibit heterogeneous health utilization patterns.

In the second set of analyses, we examined the effects of CC severity by reclassifying children with a CC (CHSGs 3–7 and 9) into three hierarchical groups: (i) episodic CC (children from CHSGs 3–4 and those with a moderate CC from CHSG 5); (ii) life-long CC (children with a single dominant CC from CHSG 5 and those from CHSGs 6–7); and (iii) complex CC (CHSG 9). This regrouping accounted for potential changes in health status over time and has been previously validated (Unpublished observations, J. Neff).

Statistical analyses

We first generated descriptive statistics on the overall study population and the comparison groups. The t -test was used to compare means, and the chi-square test was used to compare proportions ($\alpha = 0.05$). We assessed variables from similar domains for collinearity. Multiple variable logistic regression models were developed to test our hypotheses and to generate adjusted odds ratios and corresponding 95% confidence intervals. To account for potential differences by age of the impact of CC status and CC severity, we ran separate regression models on the following three groups: (i) children <15 ; (ii) children <6 ; and (iii) children 6–14. All data were analyzed using PASW 17.0.

Results

Description of study population

About 37% of children in our study had a CC (Table 1). Regarding CC severity, 25% of the study population had an episodic CC, 11% had a life-long CC, and 1% had a complex CC. Children with a CC were significantly older than children without a CC ($P < 0.0001$). While the majority of children were White (61%), nearly one-in-five children had missing race/ethnicity data. About 1.4% of children with a CC had previously received dental treatment under GA (in CY2003–2005), whereas this rate was 1% for children without a CC ($P < 0.0001$).

Dental treatment under GA (CY2006–2008)

Less than 1% of Medicaid-enrolled children from our baseline 2005 cohort received dental treatment under GA in CY2006–2008 ($n = 328$). While the majority of these children did not have a CC (57.3%), 16.8% had an episodic CC, 23.2% had a life-long CC, and 2.7% had a complex CC (Table 2). A significantly greater proportion of children who received dental treatment under GA in CY2006–2008 had previously received dental treatment under GA ($P < 0.0001$).

Regression models

Before constructing the regression models, we dropped the Medicaid eligibility program variable because of partial collinearity with CC status and the race/ethnicity variable because of the large proportion of children with unknown/missing data (18.3%). All other model covariates were included in our models.

CC Status (Table 3)

- Children <6 (Model 2a). CC status failed to reach statistical significance.

- Children 6–14 (Model 3a). Those with a CC were three times as likely to have received dental treatment under GA ($P < 0.0001$).
- Previous receipt of dental treatment under GA was significantly associated with subsequent receipt of dental treatment under GA in all three models.

CC Severity (Table 4)

- Children <6 with a CC (Model 2b). Those with a life-long CC were twice as likely to have received dental treatment under GA as children with an episodic CC ($P < 0.05$); there was no significant difference between children with a complex CC or an episodic CC ($P = 0.67$).
- Children 6–14 with a CC (Model 3b). The odds of receiving dental treatment under GA increased with CC severity.

Discussion

This is the first published study, to our knowledge, that examined the determinants of dental treatment under GA separately for younger and older children. It is also the first to investigate relationship between CC status and severity, on the one hand, and dental treatment under GA for Medicaid-enrolled children.

There are two main findings from this investigation. The first is that CC status was a more important determinant of dental treatment under GA for older children than for younger children. A possible explanation is that early childhood caries, a condition that is preventable in most children, was the main reason young children were treated under GA. In fact, 93.8% of children age <6 in our study received restorative care (e.g., fillings, stainless steel crowns, root canal therapy), whereas this proportion was 53.5% for children ages 6–14. This provides support for the hypothesis that older children require treatment under GA for more complicated reasons such as behavioral or medical comorbidities. Based on these findings, we failed to reject the hypothesis of no difference in receipt of dental treatment under GA by CC status for children age <6. We rejected the hypothesis of no difference in receipt of dental treatment under GA by CC status for children ages 6–14.

The second set of findings involves CC severity. For older children with a CC, there was a direct relationship between CC severity and dental treatment under GA. The most severely affected children were the most likely to have received dental treatment under GA. This is not surprising. Dentists may be more comfortable treating children with complex CCs under GA because of patient safety considerations. In addition, caregivers of children with more complex CCs may prefer GA because it eliminates the need for multiple dental visits. Furthermore, given the cumulative nature of oral diseases, children with complex CCs may have greater unmet need than those with less severe CCs because of delays in the receipt of dental treatment. Thus, higher GA utilization rates may be an indication of greater levels of pent-up demand for dental care. For younger children with a CC, those with a life-long CC were twice as likely as those with an episodic CC to receive treatment under GA. There was no significant difference for younger children with an episodic or complex CC. The failure to detect a direct relationship between CC severity and dental treatment under GA could be because: (i) younger children with a complex CC have other nondental health care needs that are higher priority; (ii) caregivers of younger children with a complex CC are extra-vigilant about providing oral hygiene and ensuring that their child visits the dentist regularly, which puts these children at lower risk for needing extensive restorative treatment; or (iii) dentists are able to manage younger children with a CC in office-based settings, whereas this becomes more difficult as children with more complex CCs get older and physically stronger. Based on these findings, we failed to reject the hypothesis of no

difference in dental treatment under GA by CC severity for children age <6 and reject the hypothesis of no difference in dental treatment under GA by CC severity for children ages 3–14.

In all of our models, primary medical care visits were not significantly associated with dental treatment under GA, which is inconsistent with previous studies (23,24). Our measure of dental utilization represents a modality of care that is not routine for most children, which reinforces the concept that the determinants of utilization are heterogeneous for dental care provided in different settings (hospital- vs office-based). We also found that previous dental treatment under GA was significantly associated with subsequent dental treatment under GA. About 0.5% of our cohort received dental treatment under GA in CY2006–2008; 6.4% of these children were repeat users with a previous dental treatment under GA in CY2003–2005. While this is not surprising given the high rates of recurrent disease for children undergoing GA and the low proportions that return for recall visits, it is cause for concern from a clinical as well as a cost perspective. Future studies should further clarify the multi-level determinants of dental utilization under GA with an emphasis on identifying the various nodes in the delivery system at which prevention-oriented clinical interventions can be implemented.

This is the first published study that examined the determinants of dental utilization under GA for publicly insured children with a CC. The clinical significance of this research is that it reinforces the importance of addressing the need for GA for younger children by focusing on the prevention of early childhood caries. We surmise that preventing caries-related disease for Medicaid-enrolled children would help to control overall dental and anesthesia-related costs. In addition, it provides preliminary evidence for the development of evidence-based guidelines on the indications for oral rehabilitation under GA. Our results also suggest that there are those for whom the GA treatment modality cannot be avoided. Older children with a CC may represent one such subgroup. As such, we believe that dental treatment under GA is part of a comprehensive approach in ensuring optimal oral health for high-risk children. Thus, policies to support the continued availability as well as funding for this modality of care are critical.

There are several strengths as well as limitations associated with this study. The first strength is that we adopted validated CC identification methods from the pediatric health services literature. In addition, we analyzed multiple years of administrative data and adopted a conceptual model on oral health disparities as the theoretical foundation for the study. There are two limitations. Because this study was based on claims data, we had no clinical information upon which an assessment of the child's baseline caries risk could be estimated. Furthermore, in our regression models, we were unable to include behavioral measures related to caregiver attitudes, knowledge, and beliefs – important determinants of dental care utilization as described by Patrick *et al.* (20). Future investigations should collect primary data from care-givers of Medicaid-enrolled children to assess the impact of factors such as the ability to brush the child's teeth regularly, diet, and behavioral comorbidities on dental treatment under GA. These behavioral factors may explain why caregivers are unable to provide home-based preventive care for children with a CC, especially for those who are older and physically stronger, which could predispose older children with a CC to dental treatment under GA.

The availability of dental treatment under GA is important for subgroups of children, including those enrolled in state Medicaid programs. Identifying and understanding the determinants of dental treatment under GA is a critical step in developing professional guidelines and clinical strategies that will prevent dental disease for Medicaid-enrolled children whose main reasons for needing treatment under GA are modifiable.

Acknowledgments

We express our gratitude to the Iowa Department of Human Services for providing access to Iowa Medicaid administrative data and to the 3M Health Information Systems for a no-cost research license for the CRG Software. This research was supported by NIDCR/NIH Grant T32-DE014678-06, a Delta Dental Foundation of Iowa Dissertation Research Grant, and a NIDCR/NIH Career Development Grant 1K08-DE020856-01.

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Figure 1.
Pictorial representation of calendar years (2003–2008) in which model covariates were measured.

Table 1 Description of Iowa Medicaid-Enrolled Children under Age 15 ($n = 62\,721$)

Variable	Children without a Chronic Condition ($n = 39\,654$) n (%)	Children with a Chronic Condition ($n = 23\,067$) n (%)	P -value* ($\alpha = 0.05$)	Total Study Population ($n = 62\,721$) n (%)
Main independent variables				
Chronic condition status				
No chronic condition	39 654 (100.0)	0 (0.0)	–	39 654 (63.2)
Chronic condition complexity				
Episodic chronic condition	0 (0.0)	15 647 (67.8)	–	15 647 (24.9)
Life-long chronic condition	0 (0.0)	6838 (29.6)	–	6838 (10.9)
Complex chronic condition	0 (0.0)	582 (2.5)	–	582 (0.9)
Ascribed factors				
Age (years)				
Mean $\pm$ standard deviation	6.4 $\pm$ 4.0	8.0 $\pm$ 4.0	<0.0001	7.0 $\pm$ 4.1
<6	18 362 (46.3)	6923 (30.0)	<0.0001	25 285 (40.3)
6–14	21 292 (53.7)	16 144 (70.0)	–	37 436 (59.7)
Sex				
Female	20 839 (52.6)	9271 (40.2)	<0.0001	30 110 (48.0)
Race/ethnicity				
White	22 705 (57.3)	15 516 (67.3)	<0.0001	38 221 (60.9)
Black	3967 (10.0)	2093 (9.1)	–	6060 (9.7)
Other	5196 (13.1)	1793 (7.8)	–	6989 (11.1)
Unknown or missing	7786 (19.6)	3665 (15.9)	–	11 451 (18.3)
Medicaid eligibility program				
Temporary Assistance to Needy Families (TANF)	36 550 (92.2)	16 496 (71.4)	<0.0001	53 017 (84.5)
Supplemental Security Income (SSI)	648 (1.6)	2359 (10.2)	–	3007 (4.8)
Foster care	2186 (5.5)	2359 (10.2)	–	4545 (7.2)
Institutionalization	210 (0.5)	1334 (5.8)	–	1544 (2.5)
Home- and Community-Based Waiver	60 (0.2)	548 (2.4)	–	608 (1.0)
Proximal factors				
Child used primary medical care in 2005				
Yes	32 579 (82.2)	20 725 (89.8)	<0.0001	53 304 (85.0)
Child received dental treatment under general anesthesia, 2003–2005				
Yes	416 (1.0)	318 (1.4)	<0.0001	734 (1.2)
Immediate factors				
At least one Medicaid-enrolled sibling in the household				
Yes	31 561 (79.6)	15 106 (65.5)	<0.0001	46 667 (74.4)
At least one Medicaid-enrolled adult in the household				
Yes	25 949 (65.4)	13 190 (57.2)	<0.0001	39 139 (62.4)
Intermediate factors				

Variable	Children without a Chronic Condition (<i>n</i> = 39 654) <i>n</i> (%)	Children with a Chronic Condition (<i>n</i> = 23 067) <i>n</i> (%)	<i>P</i> -value* (α = 0.05)	Total Study Population (<i>n</i> = 62 721) <i>n</i> (%)
Degree of rurality of child's county of residence				
Metropolitan	21991 (55.5)	12 884 (55.9)	<0.01	34 875 (55.6)
Urban adjacent to metropolitan	7620 (19.2)	4318 (18.7)	–	11 938 (19.0)
Urban nonadjacent to metropolitan	7776 (19.6)	4680 (20.3)	–	12 456 (19.9)
Rural	2267 (5.7)	1185 (5.1)	–	3452 (5.5)
Distal factors				
Resides in a dental Health Professional Shortage Area				
Yes	26 530 (66.9)	15 269 (66.2)	0.07	41 799 (66.6)

* *P*-value results of significance testing for differences between children with and without a chronic condition

Table 2

Description of Iowa Medicaid-Enrolled Children under Age 15 with and without Dental Treatment under General Anesthesia, 2006–2008 ($n = 62,721$)

Variable	Children without Dental Treatment under GA ($n = 62\,393$) n (%)	Children with Dental Treatment under GA ($n = 328$) n (%)	P -value* ($\alpha = 0.05$)
Main independent variables			
Chronic condition status			
No chronic condition	39 466 (63.3)	188 (57.3)	<0.05
Any chronic condition	22 927 (36.7)	140 (42.7)	–
Chronic condition complexity			
Episodic chronic condition	15 592 (25.0)	55 (16.8)	<0.0001
Life-long chronic condition	6762 (10.8)	76 (23.2)	
Complex chronic condition	573 (0.9)	9 (2.7)	
Ascribed factors			
Age (years)			
Mean $\pm$ standard deviation	7.0 $\pm$ 4.1	4.7 $\pm$ 3.4	<0.0001
<6	25 084 (40.2)	227 (69.2)	<0.0001
6–14	37 335 (59.8)	101 (30.8)	–
Sex			
Female	29 957 (48.0)	153 (46.6)	0.62
Race/ethnicity			
White	38 028 (60.9)	193 (58.8)	<0.01
Black	6044 (9.7)	16 (4.9)	–
Other	6943 (11.1)	46 (14.0)	–
Unknown or missing	11 378 (18.2)	73 (22.3)	–
Medicaid eligibility program			
Temporary Assistance to Needy Families (TANF)	52 781 (84.6)	236 (72.0)	<0.0001
Supplemental Security Income (SSI)	2977 (4.8)	30 (9.1)	–
Foster care	4533 (7.3)	12 (3.7)	–
Institutionalization	1503 (2.4)	41 (12.5)	–
Home- and Community-Based Waiver	599 (1.0)	9 (2.7)	–
Proximal factors			
Child used primary medical care in 2005			
Yes	52 996 (84.9)	308 (93.9)	<0.0001
Child received dental treatment under general anesthesia, 2003–2005			
Yes	713 (1.1)	21 (6.4)	<0.0001
Immediate factors			
At least one Medicaid-enrolled sibling in the household			
Yes	46 467 (74.5)	200 (61.0)	<0.0001
At least one Medicaid-enrolled adult in the household			
Yes	38 927 (62.4)	212 (64.6)	0.40
Intermediate factors			

Variable	Children without Dental Treatment under GA (<i>n</i> = 62 393) <i>n</i> (%)	Children with Dental Treatment under GA (<i>n</i> = 328) <i>n</i> (%)	<i>P</i> -value* (α = 0.05)
Degree of rurality of child's county of residence			
Metropolitan	34 736 (55.7)	139 (42.4)	<0.0001
Urban adjacent to metropolitan	11 872 (19.0)	66 (20.1)	–
Urban nonadjacent to metropolitan	12 359 (19.8)	97 (29.6)	–
Rural	3426 (5.5)	26 (7.9)	–
Distal factors			
Resides in a dental Health Professional Shortage Area			
Yes	41 629 (66.7)	170 (51.8)	<0.0001

* *P*-value results of significance testing for differences between children with and without dental treatment under general anesthesia (GA).

Multiple Variable Logistic Regression Models for Dental Treatment under General Anesthesia for Iowa Medicaid-Enrolled Children (*reference group)

Table 3

Covariate	Model 1a: all children (n = 62 721)			Model 2a: children under age 6 (n = 25 285)			Model 3a: children ages 6–14 (n = 37 436)		
	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)
Main independent variable									
Has a chronic condition									
Yes	1.44	1.14, 1.81	<0.01	1.05	0.78, 1.41	0.74	3.01	1.88, 4.82	<0.0001
No*	1	–	–	1	–	–	–	–	–
Ascribed factors									
Age (years)									
Continuous	n/a	n/a	n/a	0.98	0.90, 1.07	0.69	0.84	0.78, 0.91	<0.0001
<6*	1	–	–	n/a	n/a	n/a	n/a	n/a	n/a
6–14	0.3	0.24, 0.39	<0.0001	n/a	n/a	n/a	n/a	n/a	n/a
Sex									
Female	1	0.80, 1.25	0.99	0.89	0.68, 1.15	0.37	1.39	0.94, 2.07	0.10
Male*	1	–	–	1	–	–	1	–	–
Proximal factors									
Child used primary medical care in 2005									
Yes	1.47	0.92, 2.36	0.11	1.01	0.53, 1.93	0.98	1.5	0.77, 2.92	0.24
No*	1	–	–	1	–	–	1	–	–
Child received dental treatment under general anesthesia, 2003–2005									
Yes	4.86	3.09, 7.64	<0.0001	2.73	1.37, 5.43	<0.01	7.82	4.17, 14.66	<0.0001
No*	1	–	–	–	–	–	–	–	–
Immediate factors									
At least one Medicaid-enrolled sibling in the household									
Yes	0.57	0.46, 0.72	<0.0001	0.87	0.65, 1.17	0.37	0.26	0.17, 0.40	<0.0001
No*	1	–	–	1	–	–	1	–	–
At least one Medicaid-enrolled adult in the household									
Yes	1.08	0.85, 1.36	0.55	1.23	0.90, 1.67	0.19	0.98	0.64, 1.50	0.92
No*	1	–	–	1	–	–	1	–	–

Covariate	Model 1a: all children (n = 62 721)			Model 2a: children under age 6 (n = 25 285)			Model 3a: children ages 6–14 (n = 37 436)		
	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)
Intermediate factors									
Degree of rurality of child's county of residence									
Metropolitan*	–	–	–	–	–	–	–	–	–
Urban adjacent to metropolitan	1.07	0.79, 1.46	0.67	1.13	0.78, 1.64	0.53	1.03	0.59, 1.80	0.91
Urban nonadjacent to metropolitan	1.82	1.40, 2.36	<0.0001	2.06	1.50, 2.83	<0.0001	1.44	0.89, 2.32	0.13
Rural	2.09	1.38, 3.20	<0.01	2.8	1.73, 4.53	<0.0001	1.05	0.42, 2.66	0.92
Distal factors									
Resides in a dental Health Professional Shortage Area									
Yes	0.54	0.43, 0.68	<0.0001	0.48	0.36, 0.63	<0.0001	0.72	0.47, 1.09	0.12
No*	1	–	–	1	–	–	–	–	–

Multiple Variable Logistic Regression Models for Dental Treatment under General Anesthesia for Iowa Medicaid-Enrolled Children with a Chronic Condition (*reference group)

Table 4

Covariate	Model 1b: all children (n = 23 067)			Model 2b: children under age 6 (n = 6923)			Model 3b: children ages 6–14 (n = 16 144)		
	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)
Main independent variable									
Chronic condition complexity									
Episodic chronic condition*	1	–	–	1	–	–	1	–	–
Life-long chronic condition	3.03	2.10, 4.36	<0.0001	1.94	1.15, 3.28	<0.05	5.34	2.98, 9.56	<0.0001
Complex chronic condition	3.28	1.57, 6.85	<0.01	1.38	0.32, 5.91	0.67	6.84	2.69, 17.42	<0.0001
Ascribed factors									
Age (years)									
Continuous	n/a	n/a	n/a	1.02	0.85, 1.21	0.85	0.85	0.78, 0.93	<0.0001
<6*	1	–	–	n/a	n/a	n/a	n/a	n/a	n/a
6–14	0.44	0.31, 0.63	<0.0001	n/a	n/a	n/a	n/a	n/a	n/a
Sex									
Female	1.14	0.81, 1.59	0.48	0.86	0.52, 1.44	0.57	1.54	0.97, 2.45	0.07
Male*	1	–	–	1	–	–	1	–	–
Proximal factors									
Child used primary medical care in 2005									
Yes	1.35	0.62, 2.94	0.44	1.51	0.21, 11.08	0.69	1.16	0.50, 2.71	0.73
No*	1	–	–	1	–	–	1	–	–
Child received dental treatment under general anesthesia, 2003–2005									
Yes	6.28	3.59, 10.99	<0.0001	6.59	2.83, 15.36	<0.0001	4.46	2.06, 9.63	<0.0001
No*	1	–	–	1	–	–	1	–	–
Immediate factors									
At least one Medicaid-enrolled sibling in the household									
Yes	0.55	0.38, 0.79	<0.01	0.98	0.57, 1.69	0.94	0.3	0.17, 0.53	<0.0001
No*	1	–	–	1	–	–	1	–	–
At least one Medicaid-enrolled adult in the household									
Yes	1.2	0.82, 1.75	0.35	1.21	0.68, 2.14	0.52	1.26	0.74, 2.13	0.40

Covariate	Model 1b: all children (n = 23 067)			Model 2b: children under age 6 (n = 6923)			Model 3b: children ages 6–14 (n = 16 144)		
	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)	Odds ratio	95% CI	P-value ($\alpha = 0.05$)
No*	1	–	–	1	–	–	1	–	–
Intermediate factors									
Degree of rurality of child's county of residence									
Metropolitan*	–	–	–	–	–	–	–	–	–
Urban adjacent to metropolitan	1	0.61, 1.63	0.99	0.96	0.47, 1.98	0.92	1.07	0.55, 2.09	0.84
Urban nonadjacent to metropolitan	1.81	1.23, 2.68	<0.01	1.83	1.02, 3.29	<0.05	1.81	1.06, 3.08	0.03
Rural	1.4	0.67, 2.95	0.37	2.07	0.79, 5.44	0.14	0.97	0.30, 3.18	0.96
Distal factors									
Resides in a dental Health Professional Shortage Area									
Yes	0.68	0.48, 0.97	<0.05	0.58	0.34, 0.98	<0.05	0.78	0.48, 1.27	0.32
No*	1	–	–	–	–	–	–	–	–