Scientific Article

A Review of Repeat General Anesthesia for Pediatric Dental Surgery in Alberta, Canada

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Abstract: ***Purpose:*** *The purpose of this study was to review data from the province of Alberta, Canada for First Nations children who required more than 1 general anesthesia (GA) procedure for dental surgery from 1996 to 2005.* ***Methods:*** *This study was limited to First Nations and Inuit children younger than 18 years old in Alberta who received 2 or more GA procedures to facilitate dental treatment. Data spanning 1996 to 2005 were provided from the Alberta Regional Office of First Nations & Inuit Health Branch, Health Canada.* ***Results:*** *The entire database contained claims for 339 children who received repeat GA procedures for rehabilitative dental care. Seventy-six percent received 2 procedures, while the remainder underwent 3 or more surgeries. Twenty-four percent of First Nations children in this cohort were subjected to >2 GA procedures. Retreatment of previously restored teeth was a common observation. The majority of children were treated by general practitioners instead of pediatric dentists. Seventy-four percent who had 2 or more surgeries were treated by general dentists at the time of the first GA procedure. The mean age of children at the time of the first GA procedure was not associated with whether children received 2 or more GA procedures for dental care (P=.07).* ***Conclusions:*** *These data suggest that there may be an over-reliance on GA to treat dental caries for First Nations children in Alberta.*
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There are 3 main groups of Aboriginal people in Canada: (1) First Nations people (both Status and Non-Status Indians); (2) the Inuit; and (3) the Métis. Epidemiological evidence from Canada indicates that Aboriginal children are particularly affected by dental caries, especially early childhood caries (ECC) during infancy and preschool years.[1-6] This disparity is often linked to poverty and limited access to care and prevention. The reality is that only Status Indians and the Inuit are recipients of dental benefits through the Non-Insured Health Benefits (NIHB) program of First Nations and Inuit Health Branch (FNIHB), Health Canada. The federal government is charged with the responsibility of providing dental care to registered First Nations and Inuit people in Canada.

Routinely, children with severe early childhood caries (S-ECC), a more aggressive and rampant form of ECC, require rehabilitative dental treatment in the hospital under general anesthesia (GA). The need for such care is generally a result of the complex nature and volume of the care required and the young ages of those involved, which prohibit treatment in ambulatory settings.[7] Many would argue, however, that not every GA procedure for pediatric dental treatment is warranted, as some children may be managed appropriately in clinical settings. On the other hand, children with developmental impairments may benefit from treatment performed under GA. Current American Academy of Pediatric Dentistry (AAPD) guidelines for the use of GA for dental rehabilitative treatment exist (Table 1).[7]

Children who undergo such surgery often have improved oral health quality of life,[8-11-12] yet GA is not without risk. Considerable likelihood of postsurgical relapse exists. For instance, recurrent caries, the failure of restorations, and new caries lesions are common.[12-20] Complications resulting from GA range from nonlife-threatening complications—such as: (1) nausea and vomiting; (2) fever; (3) pharyngitis; and (4) swollen lips—to life-threatening difficulties, including: (1) bronchospasms; (2) anaphylaxis[21,22]; (3) cardiac arrest; and (4) respiratory failure.[23,24] Rehabilitative treatment in the operating room is not a permanent solution for some children afflicted with S-ECC or caries during childhood. Quite often, children require repeat surgeries to deal with new dental diseases or the failure of past dental treatment. Explanations for repeated dental surgery and failure of past treatment include: (1) insufficient treatment planning; (2)

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Table 1. RECOMMENDED GUIDELINES FOR GENERAL ANESTHESIA

Indications for general anesthesia*

1. Patients unable to cooperate due to a lack of psychological or emotional maturity and/or mental, physical, or medical disability.
2. Patients for whom local anesthesia is ineffective because of acute infection, anatomic variations, or allergy.
3. The extremely uncooperative, fearful, anxious, or uncommunicative child or adolescent.
4. Patients requiring significant surgical procedures.
5. Patients for whom the use of deep sedation or general anesthesia may protect the developing psyche and/or reduce medical risks.
6. Patients requiring immediate, comprehensive oral/dental care.

* Source: American Academy of Pediatric Dentistry.[7]

provider competence; (3) virulence of cariogenic microorganisms; and (4) poor oral hygiene of those who have previously undergone treatment.[14]

In many Canadian cities, treatment under GA in the hospital is frequently reserved for certified pediatric dentists, as some general practitioners may lack sufficient training to formulate realistic treatment plans for children with complex dental needs.

A fundamental limitation of this treatment approach is that it does not focus on the real causes of ECC, but only on the symptoms and signs of disease. This preoccupation with the delivery of restorative care has not been helpful in focusing attention on preventive approaches to avert or manage early stages of ECC. These preventive approaches include: (1) application of fluoride varnishes; (2) other chemotherapeutic agents (eg, silver fluoride and Betadine); and (3) alternative restorative techniques using glass ionomer materials that can assist in preventing caries or delaying treatment until such a time when care can be provided in outpatient clinical settings.[25]

This study's purpose was to review data from the province of Alberta, Canada for children with dental benefits from the NIHB program of FNIHB, Health Canada, who have required >1 GA procedure for dental surgery from 1996 to 2005 as part of an overall program review of GA policies. Therefore, this study was limited to First Nations and Inuit children in Alberta and did not include other children requiring multiple GA procedures to facilitate dental treatment in the province. Specific objectives included: (1) determining the number of children receiving multiple/repeat GA procedures; (2) the nature of their care; and (3) variables associated with these occurrences.

Methods

This investigation relied on data provided from the Alberta Regional Office of FNIHB, Health Canada. Data spanned the years 1996 to 2005 inclusive. Only those cases in which children received repeat GA procedures (≥2 episodes) for dental treatment—paid for by FNIHB—in the province of Alberta were included in this study. This study was approved by the Health Research Ethics Board of the University of Manitoba, Winnipeg, Manitoba, Canada.

Variables recorded in the database included the: (1) date of birth; (2) date of each GA procedure; (3) child's sex, when possible; (4) practitioner type (general dentist vs pediatric dentist); (5) unique practitioner code; and (6) agency funding the dental treatment (FNIHB, Alberta Health Care, or other).

Individual tooth codes existed, and treatment was classified as: (1) restoration; (2) restoration+pulpotomy; (3) restoration+pulpectomy; (4) stainless steel crown (SSC); (5) SSC+pulpotomy; (6) SSC+pulpectomy; (7) extraction; or (8) sealant. In addition, collected were the total number of: (1) restorations; (2) restorations+pulpotomy; (3) restorations+pulpectomy; (4) SSCs; (5) SSCs+pulpotomy; (6) SSCs+pulpectomy; (7) extractions; and (8) sealants.

A database devoid of any identifying information was created based upon the data forms provided from FNIHB. First and last patient names, along with their client identification numbers, were deleted. Only their dates of birth remained to facilitate calculations regarding each child's age at the time of dental treatment under GA.

Data were entered into Microsoft Access (Microsoft Corp., Redmond, Wash.) and analyzed using Number Cruncher Statistical Software 6.0 (NCSS; Number Cruncher Statistical Systems, Kaysville, Utah). Frequencies were calculated in addition to mean values and standard deviations (SD). Analyses employed in this investigation also included: (1) chi-square testing; (2) analysis of variance (ANOVA); and (3) t tests. A P-value of ≤.05 was selected to denote statistical significance.

Results

The entire database contained 339 children who received repeat GA procedures for rehabilitative dental care. While all children received at least 2 GA procedures:

a. the majority only experienced 2 GA procedures (N=257, 76%);
b. 59 received 3 procedures;
c. 12 experienced 4 procedures; and
d. others were exposed to as many as 5 (N=5) and 6 (N=6) surgeries.

Table 2. MEAN AGES OF CHILDREN AND PRACTITIONER TYPE FOR EACH GENERAL ANESTHESIA (GA) PROCEDURE

GA Procedure	N	Mean age ± SD (months)	Range (months)	General practitioner N (%)	Pediatric dentist N (%)
First	339	38.6±18.3	12.9-134.6	252 (74)	87 (26)
Second	339	64.7±23.8	23.5-163.4	241 (71)	98 (29)
Third	82	75.8±21.3	40.4-123.9	62 (76)	20 (24)
Fourth	23	86.2±18.6	57.6-118.5	20 (87)	3 (13)
Fifth	11	97.3±22.0	68.7-141.1	11 (100)	0 (0)
Sixth	6	117.7±27.2	83.8-154.2	6 (100)	0 (0)

While the sex of some participants was unknown, there was an even distribution of males (50%) and females (50%).

Mean (±SD) ages for children along with age ranges according to the time of the various surgeries is found in Table 2. While the mean age at the time of the first surgery was 38.6±18.3 months, the youngest child was 12.9 months and the oldest was 134.6 months (11.2 years of age). The mean age at the second surgery was 64.7±23.8 months (5.5 years), indicating that the majority was near the latter stages of preschool life.

The majority of children receiving multiple GA procedures for dental surgery were treated by general practitioners (Table 2). A pattern emerged indicating that, at each GA procedure, general practitioners and not pediatric dentists were providing the majority of care for this cohort. Furthermore, it appears that 74% of children who were subjected to 2 or more dental surgeries under GA were treated by general dentists at the time of their first surgery (Table 2). Fifth and sixth procedures were exclusively provided by general practitioners. In addition, of the 23 children who underwent >4 , 83% were treated by general dentists at the first procedure.

There was no significant difference in the total mean number of surgical episodes children were exposed to according to the type of practitioner performing the first surgery (2.4±0.8 (general practitioner) vs 2.3±0.5 (pediatric dentist), P=.2) Children being treated by general dentists at the time of the second or third surgery were significantly more likely to undergo more GA procedures than those treated by a pediatric dentist (P=.04, P=.055, respectively). Nevertheless, there were no statistically significant differences in the mean number of total GA procedures a child received and the type of provider at the time of the first or fourth surgical episode (P>.05). Chi-square testing revealed no significant relationship between the type of first provider and the number of GA procedure exposures (P=.4). There were no significant differences in the mean ages of children treated by specialists and nonspecialists alike, except for the first repeat anesthetic (ie, second GA)procedure. In these instances, those treated by a pediatric dentist were significantly older than those treated by a generalist (70.3±26.8 months vs 62.5±22.1 months, P=.006).

The average length of time between the first and second procedure was 26.1±15.5 months, while the interval between the second and third GA procedure was 23.5±12.6 months. The average time between surgeries under GA decreased as the number of GA procedures increased. Furthermore, there was no significant association with the time interval between repeat surgeries and whether children were treated by a general practitioner or specialist at the time of the previous surgery (first and second: P=.34; second and third: P=.1; third and fourth: P=.4).

Table 3. MEAN ±SD NUMBER OF PRIMARY AND PERMANENT TOOTH PROCEDURES PERFORMED UNDER GENERAL ANESTHESIA (GA)

GA Procedure	Restorations	Restorations with pulp treatment	Stainless steel crowns	Stainless steel crowns with pulp treatment	Extractions	Sealants
First	5.4 ± 2.9	2.2 ± 1.6	4.1 ± 2.9	2.9 ± 1.7	3.3 ± 1.6	2.8 ± 1.9
Second	3.7*± 2.3 P<.0001	1.3 ± 0.7	3.4*± 2.4 P=.02	2.4 ± 1.6	2.8*± 2.1 P=.005	3.0 ± 1.3
Third	3.9 ± 2.5	1.3 ± 0.5	3.1 ± 2.2	1.5 ± 0.5	2.4 ± 1.4	2.5 ± 1.4
Fourth	3.3 ± 1.8	1.0 ± 0.0	2.5 ± 1.4	1.8 ± 1.1	2.1 ± 1.3	-
Fifth	4.0 ± 1.9	1.5 ± 0.7	1.0 ± 0.0	-	1.5 ± 1.0	-
Sixth	1.6 ± 1.3	2.0 ± 0.0	2.7 ± 2.1	1.0 ± 0.0	1.4 ± 0.6	2.5 ± 0.7

* Significantly differs from previous general anesthesia procedure—paired t test.

Table 4. MEAN ±SD NUMBER OF PROCEDURES COMPLETED AT FIRST TO FOURTH GENERAL ANESTHESIA (GA) PROCEDURE BY PRACTITIONER TYPE

Procedure	First GA		Second GA		Third GA		Fourth GA	
	Restorations	P value	Restorations with pulp treatment	P value	Stainless steel crowns	P value	Stainless steel crowns with pulp treatment	P value
Restoration								
GP †	5.8±3.0	<.001*	3.8±2.3	.7	4.0±2.6	.6	3.6±1.8	.2
PD ‡	4.3±2.4		3.6±2.1		3.5±2.1		2.0±1.7	
Restoration and pulpotomy								
GP	2.1 ± 1.6	.4	1.3 ± 0.7	.15	1.3 ± 0.5	.6	1.0 ± 0.0	
PD	2.5 ± 1.6		2.0 ± 0.0		1.0 ± 0.0		0.0	
SSC								
GP	4.5 ± 3.2	.009	3.6 ± 2.7	.04	2.9 ± 2.4	.4	1.8 ± 0.5	.04
PD	3.3 ± 2.1		2.9 ± 1.8		3.5 ± 1.8		4.0 ± 1.4	
SSC and pulpotomy								
GP	2.9 ± 1.7	.5	2.3 ± 1.6	.2	1.3 ± 0.5	.01	2.0 ± 1.2	.5
PD	3.1 ± 1.8		2.7 ± 1.7		2.0 ± 0.0		1.0 ± 0.0	
Extraction								
GP	3.3 ± 1.4	.8	2.7 ± 2.1	.7	2.4 ± 1.3	.6	2.2 ± 1.2	–
PD	3.4 ± 2.0		2.9 ± 2.0		2.6 ± 1.6		0.0	
Sealant								
GP	2.9 ± 1.8	.8	3.2 ± 1.3	.3	2.5±1.5	.9	–	–
PD	2.6 ± 2.3		2.8 ± 1.3		2.3±1.5			

* *p*-value from ANOVA † GP=general practitioner; ‡ PD=pediatric dentist.

The mean number of specific dental procedures performed at each GA procedure appears in Table 3. Restorations and SSCs with or without pulpal therapy on both primary and permanent teeth were the most common procedures provided. Two-tailed paired *t* testing was used to determine if there were any significant differences in the mean number of procedures between successive procedures. The only significant differences observed involved a decline in the mean number of restorations, SSCs, and extractions performed between the first and second surgeries.

Extractions were the most frequently performed procedure for the primary maxillary incisors (37%-43%), while restorations were the most common procedure provided for primary canines and molars at the first surgery. At the time of the second GA procedure, extractions were again the most common procedure for the primary maxillary and mandibular incisors. This may be partially explained by the mean age at the time of the first repeat procedure, which approximated the eruption of the permanent mandibular incisors. SSCs and restorations were the most commonly performed procedures for the remaining primary teeth.

Table 4 reports the mean number of specific procedures performed by both specialists and generalists at the first, second, third, and fourth surgical encounter. ANOVA revealed that general dentists provided significantly more restorations and SSCs ($P<.001$ and $P=.009$, respectively) at the first surgery among this cohort of children subjected to repeat surgery. There was no significant difference in the mean number of teeth extracted by general practitioners or pediatric dentists ($P=.8$). Similar analysis at the time of the first repeat GA procedure revealed that there were no significant associations between the mean number of teeth undergoing specific dental procedures and the type of provider—with the exception of SSCs ($P=.04$). General dentists provided significantly more SSCs than pediatric dentists during the second surgery. Statistics regarding the third surgical event and the volume of specific care provided by dentists revealed that pediatric dentists, on average, completed significantly more SSC+pulpotomies than did general dentists (2.0±0.0 vs 1.3±0.5, $P=.01$). There were, however, no other significant provider differences in the numbers of a given procedure. Likewise, ANOVA revealed that pediatric specialists performed significantly more SSCs than did generalists during the fourth procedure ($P=.04$), but there were no other significant differences found between specialists and nonspecialists.

The absence of a control group of First Nations children who only received 1 GA procedure posed a challenge for data analysis. Therefore, to assess the relationship between the child's age and the likelihood of undergoing repeat dental surgery, the cohort was separated into 2 groupings: (1) children only receiving 2 surgeries; and (2) children who underwent >2 procedures.

Results from ANOVA indicated that there was no significant difference between age at the first procedure and whether children underwent ≥2 procedures (39.6±18.6 vs 35.5±17.0 months, $P=.07$). On the other hand, children who experienced >2 GA procedures were significantly younger at the time of the first repeat surgery than those who underwent only 2 surgeries (52.6±18.9 vs 68.7±23.9 months, $P<.001$).

Chi-square analysis revealed that there were no statistically significant relationships between the type of provider at either the first or second procedure and whether children underwent >2 procedures ($P=0.7$ and $P=0.1$, respectively).

Table 5 reports the mean number of new teeth receiving treatment at each GA procedure event and the number of teeth undergoing retreatment, beginning with the first repeat surgery. A tooth was considered to have undergone retreatment if it received further restorative care or was extracted at a following procedure. On average, each child had 10 teeth treated at the first surgery. Thereafter, children had approximately 2 to 4 new teeth treated at each additional GA procedure, while 2 to 4 teeth received retreatment. There was a significant decline in the number of new teeth undergoing treatment between the first repeat surgery and the first surgical episode (t test; $P<.001$) and again between the first repeat procedure and the third surgical episode ($P<.03$). There were no significant differences from one GA procedure to the next in the volume of teeth being retreated.

Table 5. MEAN ±SD NUMBER OF INITIAL RESTORATIONS AND TEETH RETREATED BY GENERAL ANESTHESIA (GA) PROCEDURE

GA Procedure	Initial Restorations	Teeth Retreated
First	10.0 ± 3.4	-
Second	4.4 ± 2.3* $P<.001$	4.1 ± 2.5
Third	3.4 ± 2.2* $P=.03$	4.1 ± 2.4
Fourth	2.7 ± 1.3	3.5 ± 2.6
Fifth	3.0 ± 1.2	2.3 ± 1.8
Sixth	2.2 ± 1.5	3.0 ± 1.7

* Significantly different from previous general anesthesia procedure;

Discussion

The use of GA to facilitate dental treatment for the pediatric population is common, especially among infants and preschoolers. Pediatric dental surgery is the most common surgical day procedure at many of Canada's pediatric hospitals.[26]

While GA is routine for young children with complex dental needs, this study's findings reveal that the mean ages of children at the time of the first and second repeat procedure is approximate 65 months and 76 months, respectively. If one assumes that all children have met developmental milestones, there should be some concern as to why some children older than 5 or 6 years are subjected to additional procedures when their care could likely be provided in an ambulatory environment. Unfortunately, this database did not include information on the child's: (1) medical condition; (2) cognitive state and psyche; or (3) emotional maturity. Without this information, this critique is speculative.

Specifically, this database did not provide any useful information to determine whether these children met the first 3 and latter 2 recommended guidelines set out by the AAPD (Table 1), yet there seems to be limited evidence to justify the need for numerous repeat procedures, as witnessed in this study. If one assumes that all children in this study were healthy and without any developmental impairments, it would appear that the volume of care provided at the fifth and sixth GA procedures did not truly warrant GA. AAPD guidelines[7] indicate that this form of treatment is appropriate for those requiring significant surgical procedures, yet Tables 3, 4, and 5 reveal that the amount of rehabilitative care completed was often minimal.

A considerable number of First Nations children receiving repeat GA procedures for dental surgery were initially treated by general dentists at the time of the initial dental operating room experience (74%). While statistical testing was limited due to the absence of a control group, the type of practitioner at the time of the first surgery was not associated with an increased number of procedures. Those who were treated by general practitioners at the first repeat surgery, however, were significantly more likely to be subjected to more procedures. This raises questions regarding the factors that might contribute to this phenomenon. Perhaps the limited number of pediatric specialists is insufficient to handle the volume of First Nations children requiring complex dental surgery, prompting the need for general dentists to provide the same care.

In addition, some of the general dentists may have lacked sufficient training and treatment planning experience, but were doing their best under difficult circumstances. For instance, the mean age of children treated by general dentists at the first repeat procedure was significantly younger than those treated by specialists. This implies that some children were receiving treatment before the entire primary dentition was erupted, contrary to some recommendations.[27,28] It is also possible that some general practitioners may have been too conservative in their treatment approaches, as specialists are aware of some of the pitfalls of treatment plans for children with rampant caries that are not sufficiently aggressive. Although one study was not able to substantiate the philosophy that aggressive treatment approaches improve clinical outcomes,[14] others have shown that SSCs are associated with less clinical failure than other restorations.[16,29] Perhaps a further review of all GA cases funded by FNIHB should be conducted to confirm this study's findings. While not the intent of this review, further analysis using practitioner profiling may also be useful, as some of the need for repeat surgery may be the result of a minority of general dentists with operating room privileges.

On the other hand, parental preferences for GA may also help to explain the large numbers of cases. It is possible that some of the GA procedures were requested because of convenience. A lack of postsurgical follow-up of this high-risk population may also contribute to the recurrence of caries and the need for subsequent surgeries. Such recurrence might be minimized through effective postsurgical preventive strategies in First Nations communities.

As many of the providers did not remain the same for children at successive surgeries, it was difficult to accurately assess the relationship between the type of dental professional and the average time between surgical episodes. In spite of this, comparisons were made between the average length of time between procedures and the type of practitioner at the previous surgery. These comparisons, however, yielded no significant differences between pediatric dentists and general practitioners.

Some differences existed between the type of treatment provided by general dentists and specialists at the various surgeries. Some of these differences may have contributed to the need for repeat GA procedures, as generalists were significantly more likely to perform restorations than specialists during the first surgery ($P<.001$). Furthermore, evidence suggests that restorations are more prone to recurrent caries and restoration failure than full metal coverage.[16,29]

This study's results agree with other published literature showing that children who undergo dental surgery under GA are still vulnerable to developing caries.[12,13] For instance, at each additional procedure, almost equal numbers of teeth received retreatment compared to teeth requiring treatment for the first time (Table 5). This finding could signify that:

1. these children may harbor significant levels of cariogenic micro-organisms;
2. these children may have inadequate oral hygiene habits; or
3. initial treatment rendered under GA was insufficient to withstand the stresses of the oral environment.

This study has significant limitations, including:

1. data entry errors, such as:
   a. transcription errors that could have been generated during the initial data entry stage when dental claim forms were entered into the NIHB claims database;
   b. coding errors that could have resulted during the transfer of data from the claims database for data entry and analysis at the University of Manitoba; and
   c. errors that could have resulted when the supplied text data from NIHB was entered into a Microsoft Access database at the University of Manitoba; and
2. the absence of a suitable control group of children treated by both general practitioners and pediatric dentists who only received 1 GA procedure, which prohibited a comparison of single vs multiple GA procedures.

Such a control group was used by Sheller et al.[27] Therefore, the authors were unable to identify risk factors significantly associated with the use of >1 GA procedure for pediatric dental surgery. Children, however, were classified into 2 categories: (1) children receiving 2 GA procedures only; and (2) children who received 3 or more GA procedures. This allowed for statistical comparisons to be made between the groups.

While this comparison was somewhat helpful, further analyses are difficult, as the practitioner often did not remain the same for many of the children. Further, in ideal circumstances, the children in this database could have been matched with controls of the same ages and genders. This would ensure that the data available would be robust enough to undertake full statistical analyses. Despite these limitations, however, this study's findings are significant, as there is sufficient evidence documenting the problem of repeat dental surgeries under general anesthesia for First Nations children in Alberta. Consequently, the majority of the analysis is descriptive, though informative.

While pediatric dental surgery under GA is associated with relapse and does not eliminate the risk of future caries development, one could argue that there is little justification for multiple GA procedures. Furthermore, it is quite disturbing that nearly 25% of children who required >1 GA procedure actually received 3 or more surgeries. Perhaps there is an over-reliance on GA for First Nations children in Alberta. Considering the potential risk posed from general anesthesia, its use for repeat dental surgery should be minimized.

This has prompted an evaluation of policies governing pediatric dental surgery under GA, including the possible adoption of stricter eligibility criteria and predetermination.

Conclusions

Based on this study's results, the following conclusions can be made for First Nations children in Alberta:

1. While all children in this study received at least 1 repeat GA procedure, 24% were subjected to >2 procedures.
2. The retreatment of teeth was common, as most children had between 3 to 4 teeth requiring additional care at subsequent surgeries.
3. There was no significant difference in the number of children receiving >2 GA procedures by the type of practitioner at either the first or second GA procedure.
4. A child's mean age at the first GA procedure was not associated with whether children received >2 GA procedures. Children undergoing 2 procedures, however, were significantly older than those receiving >2 procedures.
5. The volume of care for those undergoing numerous repeat surgeries may not have warranted general anesthesia.

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References

1. Schroth RJ, Smith PJ, Whalen JC et al. Prevalence of caries among preschool-aged children in a northern Manitoba community. J Can Dent Assoc 2005;71:27-27f.
2. Schroth RJ, Moore P, Brothwell DJ. Prevalence of early childhood caries in 4 Manitoba communities. J Can Dent Assoc 2005;71:567-567f.
3. Peressini S, Leake JL, Mayhall JT et al. Prevalence of early childhood caries among First Nations children, District of Manitoulin, Ontario. Int J Paediatr Dent 2004;14:101-10.
4. Young TK, Moffatt ME, O'Neil JD et al. The population survey as a tool for assessing family health in the Keewatin region, NWT, Canada. Arctic Med Res 1995;54 Suppl 1:77-85.
5. Harrison RL, Davis DW. Caries experience of Native children of British Columbia, Canada, 1980-1988. Community Dent Oral Epidemiol 1993;21:102-7.
6. Harrison R, MacNab A, Duffy D et al. Brighter smiles. Service learning, inter-professional collaboration and health promotion in a First Nations community. Can J Public Health 2006;97:237-40.
7. American Academy of Pediatric Dentistry. Guideline on behavior guidance for the pediatric dental patient. Pediatr Dent 2006;28:97-105.
8. Filstrup SL, Briskie D, da Fonseca M et al. Early childhood caries and quality of life: child and parent perspectives. Pediatr Dent 2003;25:431-40.
9. Acs G, Shulman R, Ng MW et al. The effect of dental rehabilitation on the body weight of children with early childhood caries. Pediatr Dent 1999;21:109-13.
10. Acs G, Pretzer S, Foley M et al. Perceived outcomes and parental satisfaction following dental rehabilitation under general anesthesia. Pediatr Dent 2001;23:419-23.
11. Thomas CW, Primosch RE. Changes in incremental weight and well-being of children with rampant caries following complete dental rehabilitation. Pediatr Dent 2002;24:109-13.
12. Berkowitz RJ, Moss M, Billings RJ et al. Clinical outcomes for nursing caries treated using general anesthesia. ASDC J Dent Child 1997;64:210-1, 228.
13. Almeida AG, Roseman MM, Sheff M et al. Future caries susceptibility in children with early childhood caries following treatment under general anesthesia. Pediatr Dent 2000;22:302-6.
14. Graves CE, Berkowitz RJ, Proskin HM et al. Clinical outcomes for early childhood caries: influence of aggressive dental surgery. J Dent Child (Chic) 2004;71:114-7.
15. Drummond BK, Davidson LE, Williams SM et al. Outcomes two, three and four years after comprehensive care under general anaesthesia. N Z Dent J 2004;100:32-7.
16. Tate AR, Ng MW, Needleman HL et al. Failure rates of restorative procedures following dental rehabilitation under general anesthesia. Pediatr Dent 2002;24:69-71.

17. Eidelman E, Faibis S, Peretz B. A comparison of restorations for children with early childhood caries treated under general anesthesia or conscious sedation. Pediatr Dent 2000;22:33-7.
18. Legault JV, Diner MH, Auger R. Dental treatment of children in a general anaesthesia clinic: review of 300 cases. J Can Dent Assoc 1972;38:221-4.
19. Sheehy E, Hirayama K, Tsamtsouris A. A survey of parents whose children had full-mouth rehabilitation under general anesthesia regarding subsequent preventive dental care. Pediatr Dent 1994;16:362-4.
20. Ng MW, Tate AR, Needleman HL et al. The influence of medical history on restorative procedure failure rates following dental rehabilitation. Pediatr Dent 2001; 23:487-90.
21. Enger DJ, Mourino AP. A survey of 200 pediatric dental general anesthesia cases. ASDC J Dent Child 1985; 52:36-41.
22. Scott JG, Allan D. Anaesthesia for dentistry in children: a review of 101 surgical procedures. Can Anaesth Soc J 1970;17:391-402.
23. Johnson EL, Roberts MW, Prasad R. Complication associated with general anesthesia: report of case. ASDC J Dent Child 2001;68:332-4.
24. Tiret L, Nivoche Y, Hatton F et al. Complications related to anaesthesia in infants and children. A prospective survey of 40240 anaesthetics. Br J Anaesth 1988;61:263-9.
25. Schroth RJ, Moffatt ME. Determinants of early childhood caries (ECC) in a rural Manitoba community: a pilot study. Pediatr Dent 2005;27:114-20.
26. Canadian Paediatric Decision Support Network. Canadian Paediatric Decision Support Network Annual Report April 2003-March 2004. Canadian Paediatric Decision Support Network. Canadian Association of Paediatric Health Centres. 1-6-2006.
27. Sheller B, Williams BJ, Hays K et al. Reasons for repeat dental treatment under general anesthesia for the healthy child. Pediatr Dent 2003;25:546-52.
28. Worthen TB, Mueller W. Implications of parental compliance on decision making in care provided using general anesthesia in a low-income population. ASDC J Dent Child 2000;67:197-9, 161.
29. Al Eheideb AA, Herman NG. Outcomes of dental procedures performed on children under general anesthesia. J Clin Pediatr Dent 2003;27:181-3.

Abstracts of the Scientific Literature

Stress levels in families of children with special needs versus healthy controls

Family functioning is a broad term that describes the psychosocial issues related to coping mechanisms of parents of children with chronic medical conditions. It encompasses such concepts as satisfaction with parenting roles, parent-child interactions, family communications, cohesion, and adaptability. This paper reviewed 15 studies on six of the most common chronic childhood illness: cystic fibrosis (CF), juvenile rheumatoid arthritis (JRA), type 1 diabetes, asthma, hemophilia, and sickle cell disease (SCD). Results: CF parents reported higher parenting stress and less spouse time, though 1 study suggested that families of adolescents with CF may be better problem solvers. For type 1 diabetes, no major differences were observed; however, some parents are more likely to describe their families as less achievement-oriented compared to parents of healthy children. No differences were observed with families of children with JRA. Results were largely inconclusive with families of children with SCD, asthma, and hemophilia compared with those of healthy children. This was due to demographic and cultural imbalances in the samples. Since hemophilia patients were predominantly males, the research highlighted the role of child gender in family functioning. Mothers of asthmatic children reported problems with stressful events, social support, and child behavior. Most studies failed to show how illness-related factors such as disease severity and time since diagnosis influenced family functioning. ***Comments:*** *This review paper highlights the need for clinicians to gain insight into the stressful events confronted by families of children with special needs and how having this awareness may create reasonable expectations for successful outcomes of treatment recommendations.* ***AOA***

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McClellan CB, Cohen LL. Family functioning in children with chronic illness compared with healthy controls: A critical review. J Pediatr 2007;150:221-3.

25 references