

Medical Diagnoses of Pediatric Dental Patients Treated under General Anesthesia: A 19 Year Review

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Objective: The objective of this study was to examine the records of pediatric dental patients treated under general anesthesia to determine if there had been any significant change in preoperative diagnoses between 1990-99 and 2000-08. **Study Design:** The records of 3298 pediatric dental patients treated in the operating room under general anesthesia at the University of North Carolina (UNC) Children's Hospital were examined and medical diagnoses recorded. The number of cases treated by calendar year was obtained. **Results:** The results of this study did not find any significant differences in percentage frequency of medical diagnoses between the years of 1990-99 and 2000-08. There has been a steady increase in the number of cases treated under general anesthesia over the period of the study. **Conclusions:** 1. Dental care under general anesthesia remains an important treatment option. 2. The medical diagnoses of children provided dental treatment under general anesthesia has not changed significantly over the past nineteen years at the UNC Children's Hospital. 3. The demand to provide dental care for children under general anesthesia has continued to increase.

Keywords: Dental, diagnosis, anesthesia, general, operating room
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INTRODUCTION

Providing dental treatment in conjunction with the use of general anesthesia is a form of pharmacological behavior management utilized by a significant number of pediatric dentists. General anesthesia is often the preferred option to provide quality dental care and to minimize potential psychological harm to the patient.

Several factors are important when considering the use of general anesthesia. The patient's dental needs must be determined and an assessment of the patient's level of anxiety and their ability to cooperate for treatment under various treatment scenarios. The child's age, emotional development and health status must also be considered. General anesthesia

may be indicated for the patient who lacks the ability to cooperate, whether this is because of the child's age, anxieties, level of psychological maturity or presence of a medical, physical/mental disability or development delays.^{1,2,3,4,5,6,7}

Previous studies have examined the level of parental acceptance of general anesthesia as an adjunct to the provision of dental treatment in children. White et al⁸ found that general anesthesia was widely accepted by parents since the dental treatment provided in this manner was believed to have a positive social impact for the child. The majority of parents agreed that their child looked better, smiled more often, were more social and demonstrated more attentiveness in school following dental treatment under general anesthesia. Other studies have cited improvement of quality of life with the relief of pain.^{9,10,11,12}

However, despite the potential benefits, some parents are not comfortable with the use of general anesthesia to provide dental care for their child. Parents' reasons for refusing the use of general anesthesia may be numerous including ones based on the cost involved.¹³ It is interesting to note that Lee et al¹⁴ demonstrated that when using a Relative Based Value Units Scale, treatment under general anesthesia provided a cost savings over the conscious sedation option when considering all parameters including travel, transportation costs and time away from work for the parent(s), if a child needs three or more conscious sedation appointments to complete dental treatment.

Legault et al² reported 6.3% of the children treated under general anesthesia had a significant medical history while Acs et al⁹ reported that 39% of their patients had a

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compromising medical or developmental condition. Enger and Mourino¹⁴ used the American Society of Anesthesiologist (ASA) risk classifications to divide their results and reported that, of their children receiving general anesthesia for dental treatment, 54% were ASA I, 39.5% were ASA II and 6.5% were ASA III.

Baens-Ferrer *et al*¹⁶ reported the most common primary health care diagnoses were autism (15%), cerebral palsy (10%) and genetic disorders (9%). Vermeulen *et al*¹⁷ reported that approximately 5% of the children treated had a significant medical history as the indicator for using general anesthesia. Cancer (31.9%), psychiatric disease (22.3%), hemophilia (19.1%) and cardiac disease (18.1%) were the most common diagnoses. Of the children with special health care needs examined by Stapleton *et al*¹⁸, the most commonly reported diagnoses were developmental delay (50%); craniofacial anomalies (23%); seizure disorders (17%); cerebral palsy (16%) and cardiac anomalies (16%).

We examined pediatric dental patient records treated under general anesthesia at the UNC Children's Hospital to determine if there had been any significant change or trends in preoperative medical diagnoses between 1990-99, and 2000-08. The number of cases treated *per* calendar year was determined.

METHODS

Data were obtained from 3298 children treated under general anesthesia (GA) at the UNC-Children's Hospital in Chapel Hill, NC from the years 1990-2008. The patients were either patients of record of the Department of Pediatric Dentistry or had been referred for assessment and treatment because of their pre-cooperative age, extenuating medical conditions, extensive dental needs and/or behavior management difficulties.

The children were all screened by a single pediatric dentist (MWR) at the Department of Pediatric Dentistry. The patient's parents were presented the treatment risks, benefits and options (RBO) in order to assist them in making an informed decision. These included no treatment, conventional care, conscious sedation and general anesthesia. The study was reviewed and approved by the University of North Carolina School of Dentistry Institutional Review Board (#08-1229).

The records were examined and the primary diagnosis was recorded. The diagnostic categories selected for this study were: Asthma, Autism, Attention Deficit Hyperactivity Disorder (ADHD), Cardiac Anomalies, Coagulation Disorders/Anemia, Craniofacial Anomalies, Developmental Delays/Mental Retardation, Genetic Syndromes/Chromosomal Disorders, Neurological Disorders and Well Child/Acute Situational Anxiety. We tested the difference in the prevalence of medical diagnoses by using a two sample means comparison test.

RESULTS

The results of this study did not find any significant differences in percentage frequency of diagnoses between the

years of 1990-99 and 2000-08 ($P > 0.05$). The percentage of pre-cooperative age and/or highly anxious but otherwise healthy children treated under general anesthesia increased from 46.7% in 1990-99 to 52.1% in 2000-08. This group showed the largest percentage increase. Table 1: The number of patients treated each year has shown a steady increase since 1990. Table 2: There were no changes in operating room/general anesthesia availability.

Table 1. Common diagnoses of pediatric dental patients treated under general anesthesia

	1990-99 N=941	2000-2008 N=2357
Diagnosis	Number (%)	Number (%)
Asthma/respiratory Issues	86 (9.1%)	207 (8.8%)
Autism	44 (4.7%)	123 (5.2%)
Attention deficit/hyperactivity disorder (ADHD)	25 (2.7%)	75 (3.2%)
Cardiac anomalies	47 (5.0%)	108 (4.6%)
Coagulation disorders/anemia	22 (2.3%)	33 (1.4%)
Craniofacial anomalies	34 (3.6%)	73 (3.1%)
Developmental delays/mental retardation	77 (8.2%)	163 (6.9%)
Genetic syndromes/chromosomal disorders	80 (8.5%)	177 (7.5%)
Neurological disorders (e.g. cerebral palsy, seizure disorders)	87 (9.2%)	170 (7.2%)
Well child/acute situational anxiety	439 (46.7%)	1228 (52.1%)

Table 2. Number of pediatric dental cases treated under general anesthesia

Year	Number of Cases
1990	46
1991	40
1992	49
1993	63
1994	91
1995	113
1996	117
1997	131
1998	144
1999	147
2000	153
2001	195
2002	220
2003	224
2004	239
2005	265
2006	333
2007	349
2008	379

DISCUSSION

The increase in the number of children found to be otherwise healthy but exhibiting acute situational anxiety related to dental care could have been the result of previous dental experiences or them being of pre-cooperative age. The decision to have the dental care provided under general anesthesia versus conscious sedation may have been influenced

by the amount of dental disease present and parental preference.

The medical/dental diagnoses profile of children treated in the operating room under general anesthesia at a major medical center may be different from that seen in smaller community hospitals or outpatient surgical centers. Private practicing dentists often refer their medically complicated pediatric patients who require general anesthesia to dental clinics at larger hospitals for restorative/surgical dental care.

The UNC Children's Hospital has an on-site medical school and medical specialty presence in addition to the UNC School of Dentistry. This access to medical specialty consultations and integrated health care provides a favorable environment to treat medically compromised patients under general anesthesia.

There is anecdotal evidence that many pediatric dentists are providing less in-office care under conscious sedation. This has possibly occurred for several reasons including more states and jurisdictions requiring additional training and special sedation permits for enteral and/or multiple drug sedation regimens, dentists being less comfortable in assuming the medical risk associated with sedation, and hesitancy in providing protective restraint even with parental/guardian consent.¹⁹ Many parents/caregivers are not comfortable with in-office deep sedation or the use of protective restraining devices and prefer that their child be provided dental care with a minimum of stress. Sharing the medical responsibility with trained anesthesia professionals is often more appealing to both the treating pediatric dentist and the parent/care-giver.

In 1999, the North Carolina (NC) General Assembly passed legislation requiring health insurance plans to provide coverage for anesthesia and medical charges associated with dental treatment performed under GA for: (1) young children; (2) people with special physical and mental health needs; and (3) those individuals with significant behavioral problems (Session Law 1999-134, House Bill 119, June 4, 1999). The law became effective on January 1, 2000 and may be playing a role in the continued increase in number of children treated under general anesthesia.^{5,8,17}

In 2008, the NC State Board of Dental Examiners (21 NCAC 16Q.0301-03, .0401-03) enacted a permit requirement to administer a drug to a child under the age of 13 years to achieve moderate conscious sedation.

Advances in health care science have resulted in children surviving with more severe health challenges. This has resulted in additional children requiring preventive dental health management to reduce the need for invasive oral procedures. Never the less, general anesthesia may be the preferred manner of management when extensive restorative or surgical dental procedures are required.²⁰

CONCLUSION

1. Dental care under general anesthesia is the treatment option chosen for many pediatric patients for a variety of reasons.

2. The medical diagnoses of children chosen for dental treatment under general anesthesia has not changed in a large medical center over the past 19 years.
3. The demand to provide dental care for children under general anesthesia has continued to increase.

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