

## Dental General Anesthesia in Pediatric Dentistry Departments of All Dubai Health Authority Sectors: Solutions to Meet with The Rising Demands

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### Abstract

**Aim:** The aim of this research is to showcase the prevalence of dental general anesthesia among children treated in Dubai Health Authority (DHA) and describe the protocol used in the pediatric dentistry department.

**Study Design:** A retrospective cross-sectional study to document the statistics of patients who underwent treatment under general anesthesia in the Pediatric Dentistry Department in Dubai Health Authority. 1,295 patients' records were assessed according to gender, age, medical history, reason of referral, reason of cancellation, treatments performed, surgery duration, and waiting time.

**Results:** A prevalence of 6.1% was obtained, of which females (48%), males (52%), 4 years old being the most common age. (83.7%) were healthy, (16.3%) medically compromised, asthma ranking most predominant (3.5%), autism (2.2%) and Syndromes (1.6%). The waiting time in the year 2014 (118 days), 2015 (154 days), and 2016 (163 days). However, the year 2017 witnessed a drastic reduction of the waiting time, dropping to 67 days regardless of the rising influx of patients.

**Conclusion:** The waiting time still managed to decrease from 2015 - 2017; this was due to several solutions: additional operation theatres, internal referral system, inhalation sedation, better utilization of operating theatres.

**Keywords:** Dental General Anesthesia; Pediatric Dentistry Department; Dubai Health Authority (DHA)

### Introduction

Dental rehabilitation under general anesthesia is a treatment choice for many pediatric dentists for managing uncooperative patients [1]. According to the American Association of Pediatric Dentistry; General anesthesia is defined as a "controlled state of unconsciousness accompanied by a loss of protective reflexes, including the ability to maintain an airway independently and respond purposefully to physical stimulation or verbal command". There are various indications for general anesthesia, ranging from extreme uncooperative behavior, to those who have psychological, physical, and medical deficiencies. Other indications include acute infections, comprehensive treatments to be done, or even in an effort to protect the psyche of the child.

For many children, receiving treatment under general anesthesia restores their quality of life by providing immediate relief from pain and discomfort [2]. According to Jankauskiene B., *et al.* a prospective clinical follow up study on Oral Health Related Quality of Life (OHRQoL) among Lithuanian children who underwent dental general anesthesia revealed a remarkable improvement on OHRQoL [3]. The study reflected the improvements on the basis of the child's symptoms and psychology as well as reduction in parental distress. The most frequently reported impacts on the child's OHRQoL were complete elimination of oral pain, improvements in eating habits and reduction in feelings of irritation among the pediatric patients. Furthermore, there was a significant reduction in feelings of guilt and

upset among parents. A Questionnaire by N Savanheimo., *et al.* done in Finland further revealed a positive impact on parents with a 73% parental satisfaction [4]. This shows that General anesthesia plays a great role in the improvement of not only dental health, but also on social and psychological levels for those who are particularly indicated for comprehensive dental care [5].

It is evident that the needs and demands for General Anesthesia in Pediatric Dentistry are increasing worldwide throughout the years. A study in Australia in 2006 noted a 3 folds increase in the use of dental general anesthesia from 1993 to 2004 [6]. Similarly, a 2014 study in Canada revealed that around 18,544 children aged 1 to 5 years between the years 1997 to 2007 were admitted for dental treatment under GA. These trends point to a rising demand in general anesthesia treatment for children [7].

Studies show that parent's perceptions about putting their children under GA have changed throughout the years. In 1984, Murphy, *et al.* found that parents showed great acceptance of behavioral management techniques especially "tell-show-do", while the use of GA was found to be the least accepted [8]. On the other hand, a study done on 55 parents who were shown videotapes on different behavioral techniques; General Anesthesia was viewed to be the 3<sup>rd</sup> most preferable procedure among which tell-show-do and nitrous oxide sedation were the first and second most preferable lines of treatment respectively [9].

The aim behind this clinical research is to obtain the population prevalence of Dubai Health Authority's (DHA) pediatric dental admissions for complete oral rehabilitation under general anesthesia. Additionally, this study will outline the recently introduced treatment protocol by the pediatric dentistry department, which resulted in the significant improvement of waiting time.

### Methodology

A retrospective cross-sectional study was performed to document the prevalence and descriptive statistics of patients who underwent complete oral rehabilitation under general anesthesia in the Pediatric Dentistry Department in DHA. This study targeted children living in the United Arab Emirates who were referred from the pediatric dental department for general anesthesia from January 2014 to December 2017. An official ethical approval was obtained from the research committee of Dubai Health Authority. The information was obtained from the minor OT logbooks of Dubai Hospital and the following variables were collected age (between 1 to 14 years), gender, medical history, reason of referral, reason of cancellation (pertaining to any reason that renders a child ineligible on day of admission for the procedure), the type of the treatments performed, duration and waiting time to receive treatment. The total number of patients who underwent general anesthesia was compared to the total number of patients seen in all of DHA dental facilities to obtain the anticipated overall prevalence. All data collected were measured using Statistical Packages for the Social Sciences (SPSS) Software version 23.

### Results

Of the 21,508 pediatric dental patients who reported to Dubai Health Authority (from 2014-2017) 1,309 of them underwent comprehensive dental treatments under General Anesthesia (14 of which were excluded due to missing data). Therefore, the number of pediatric dental patients comprised in this study would be a total of 1,295, debuting an overall prevalence of 6.1%. Among the pediatric dental patients who underwent general anesthesia, 48% (627) of them were female, and 52% (668) were male, presenting a nearly equal gender distribution.

The number of patients' admissions in the year 2014, 2015, 2016 and 2017 encountered a total of 250, 285, 399 and 361 patients respectively. It is worthy to note that by October 2015, there has been an increase in operation theatre availability from 2 to 3 times per week.

The most prevalent age encountered in the study was 4 years old (Table 1). Out of the entire sample size, 1,084 (83.7%) of them were healthy; the remaining 211 (16.3%) were medically compromised of which asthma was found to be the most predominant (3.5%), fol-

lowed by autism (2.2%) (Table 2). Almost all the patients of the sample size were referred to general anesthesia due to situations where the child was uncooperative, having extensive caries and/or acute infections. Only those with severe forms of asthma, autism and coagulation disorders with multiple caries were referred to general anesthesia primarily due to their compromised health status. These particular reasons of referrals were based on the documentations of the pediatric specialists in their clinic settings.

Age	Number of pts.	Percentage
1	2	0.2
2	49	3.8
3	213	16.4
4	327	25.3
5	318	24.6
6	200	15.4
7 yrs and above	186	14.3

**Table 1:** Frequencies and percentages of the patients ages who underwent complete oral rehabilitation under General A from January 2014 to December 2017.

Health Status	Number of pts.	Percentage	Mean Age
Healthy	1084	83.7%	4.7
CHD	19	1.5%	5.3
Syndromes	21	1.6%	6
Cerebral palsy	14	1.1%	7
Autism	28	2.2%	6.68
Asthma	46	3.5%	5
Mental Disabilities	10	0.8%	7.3
Coagulation disorder	11	0.8%	5.4
Epilepsy	14	1.1%	6.1
Others	48	3.7%	4.9
Overall	1295	100%	4.9

**Table 2:** Prevalence's and mean age of the documented health statuses of the sample.

The overall mean age was 4.9 years old. Among the healthy patients' category, the mean age was found to be 4.7 years old. Children diagnosed with mental disabilities had a mean age of (7.3 years old), Cerebral Palsy (7 years old), Autism (6.68 years old). This indicates that the referred patients who were medically compromised were significantly older (Table 2).

The most common treatment procedure done under general anesthesia was primary tooth extraction (40.9%), followed by Stainless Steel Crowns (20.7%), Composite fillings (15.8%) and endodontic treatment (15%) (Table 3 and Figure 1).

Treatment	Total number of teeth	Number of Primary Teeth	Number of Permanent Teeth
Extraction	7926 (41.4%)	7841 (40.9%)	85 (0.4%)
Endodontic	2904 (15.2%)	2876 (15%)	28 (0.1%)
SSC	4021 (21%)	3969 (20.7%)	52 (0.3%)
Amalgam	63 (0.3%)	30 (0.1%)	33 (0.2%)
Composite	3405 (17.8%)	3037 (15.8%)	368 (1.9%)
GIC	148 (0.8%)	132 (0.7%)	16 (0.1%)
Fissure Sealant	695 (3.6%)	301 (1.6%)	394 (2%)

Table 3: The different documented dental treatments per tooth (primary and permanent).

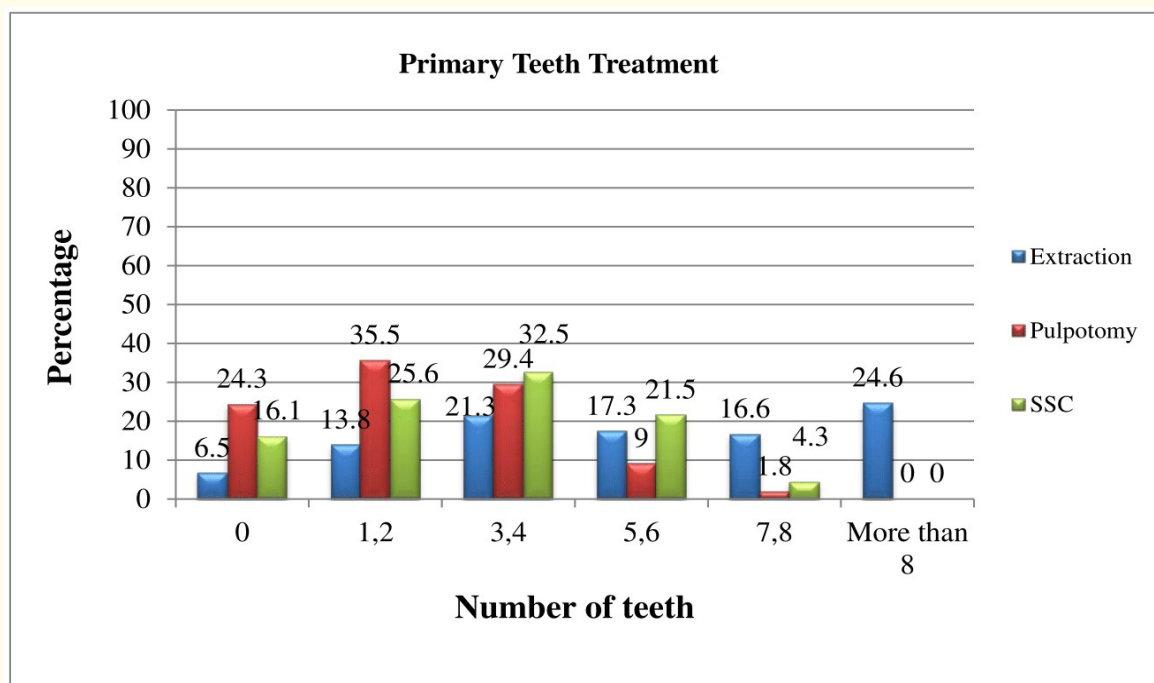


Figure 1: Bar chart showing the top most 3 prevalent Primary Teeth Treatment.

The most common duration of the procedure was in the range of 30 - 60 minutes (48%), followed by 60 - 90 minutes (33%), > 90 minutes (15%) and lastly 0 - 30 minutes (4%).

An important finding in this study is the waiting time, the highest was observed to be in the year 2016 with an average waiting time of 163 days. The years 2014 and 2015 were found to have an average waiting time of 118 and 154 respectively. While the year 2017 witnessed a drastic drop in waiting time (67 days in average). This reveals that the waiting time was significantly lowered in the year 2017 even though the influx of patients every year remained unchanged (Figure 2).

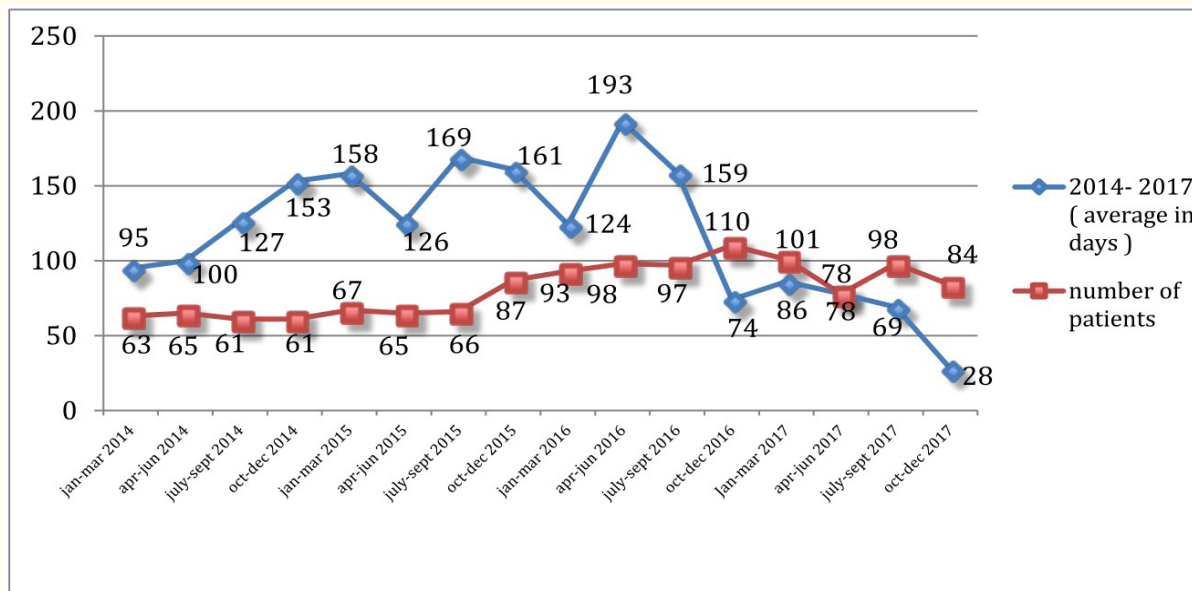


Figure 2: Line chart showing the average waiting time per days from 2014-2017.

The success behind this descent is due to several factors that were implemented in the DHA pediatric dentistry department. Firstly, a screening clinic was created where all referred patients were attempted treatment by a senior pediatric dentist to remove them from the list. Secondly, introduction of inhalation sedation for patients that were very anxious and finally, the number of cases seen per GA session was increased with two operators covering that session. Due to the introduction of these measures especially with the implementation of an efficient screening system, many patients were removed from the General Anesthesia list.

The study results witnessed a concentrated utilization of the operation theatre availability that aided in the drop of the waiting time. In fact, the year 2016 witnessed a full utilization of 3 patients per session (76.8%). This focused utilization was consistent all year round, including the month of Ramadan, where the highest percentage of full utilization of the facilities was evident (92.3%) in 2016 (Table 4).

Year	OT Utilization Per Session				OT Utilization Per Session in Ramadan	
	4 Cases and above	3 Cases	2 Cases	1 Case	2 Cases	1 Case
2014	12.1%	39.6%	42.9%	5.5%	57.1%	42.9%
2015	0.9%	58.9%	35.5%	4.7%	87.5%	12.5%
2016	1.4%	76.8%	18.1%	3.6%	92.3%	7.7%
2017	7.5%	51.5%	27.6%	13.4%	83.3%	16.7%

Table 4: Percentages of operating theater utilization during standard working hours and the holy month of Ramadan working hours from the year of 2014 - 2017.

Another factor that was assessed was the reason of cancellation, 71 patient cancellations were observed due to various reasons, the most predominant one attributed to the patients’ medical status of being unfit (76.1%) (Table 5). Regarding the patient recalls for follow up, 31.3% did not attend while 51% underwent preventive treatment (in office-fluoride applications, fissure sealants, child prophylaxis), 12.7% restorative-treatments, and 4.2% complex-treatments (extractions, pulpotomies), with 0.8% pending follow-ups.

Reason of cancellation	Number of pts.	Percentage
Medically unfit on the day of surgery	54	76.1
Pre-anesthesia check up not done	5	7
Parent refused on day of surgery	4	5.6
Malfunction of OT dental machine	3	4.2
Error in patient booking	2	2.8
Food intake on the day of surgery	1	1.4
Others	2	2.8

**Table 5:** Frequencies and percentages of patients’ reasons of cancellation.

**Discussion**

1,295 pediatric dental patients underwent comprehensive dental treatments under General Anesthesia in Dubai Health Authority from 2014 to 2017 which account for 6.1% of the total population requiring GA. Additionally, the most common age group were 4 - 5 with medically compromised patients have a tendency to be older. The most common medically compromised condition was Asthma followed by autism, various syndromes, CHD. The commonly performed treatments were extractions followed by crowns and composite restorations.

In Taipei General Hospital, 791 cases were treated under GA from 2006 to 2015 [10]. Another study done at the university of California to investigate the characteristics of out-patients and dental treatment under general anesthesia of Pediatric Dentistry at the UCSF Surgery Center reported that 156 pediatric dental patients were seen from 1990 to 1992 [11]. This shows the huge demand over dental treatment under general anesthesia among patients seen in the Pediatric Dentistry Department in Dubai Health Authority.

Almost all the patients were referred to general anesthesia due to situations where the child was uncooperative, having extensive caries and/or acute infections. These findings are in agreement with a retrospective study done in the Inonu University Disabled Dental Care Centre that investigated 467 cases who underwent dental surgery under general anesthesia between 2011 and 2014 that reported that cooperation difficulty was the most common reason for referral in 213 (45.6%) cases [13]. In contrast, a study in Malaysia showed 43.6% of patients were referred to be treated under general anesthesia due to medical problems while 34.4% were referred due to behavioral problems [12].

The most common age in the patients that underwent general anesthesia was 4 years, which fits with the findings in the Chia Lang study that reported 3 - 6 years as the most common age group both in the medically compromised and healthy patients [14]. An interesting finding in our study was that the mean age of the medically compromised patients was significantly higher than healthy patients. This is in agreement with a study that was done in Barcelona to compare oral pathology, frequency and severity of postoperative complications among 2 groups of pediatric dental patients receiving treatment under general anesthesia, one of the groups included healthy patients with a mean age of 6.72 years old and the other group included patients with cerebral palsy with a mean age of 10.57 years [15].

Most of the patients that were included in our study were healthy while 16.3% of them were medically compromised which is similar with the study done in Hospital Universiti Sains Malaysia. Out of the 211 medically compromised patients in our study asthma was found to be the most predominant (3.5%) compared to 3.4% in the study done in Malaysia, which makes it the third most prevalent after Syndromes at 10.9% [12].

The most common dental treatment performed under general anesthesia was primary tooth extractions (93.6% of the patients), this agrees with the study done in Turkey (51.2%) [13]. However, in the Chia-Ling Tsai study, operative treatment was the most common treatment while tooth extraction ranked last [14].

The Duration of dental procedures was found to be in the range of 30 - 60 minutes (48%) with an average of 66 min. Chia-Ling Tsai Reported that 3.1 hours was the mean treatment time for both groups investigated [14] while Ahmet Selim Ozkakan reported that the mean intervention time was 114.5 minutes [13]. Furthermore, in a study done by Stephanie Rashewsky to find the estimate time and cost of general anesthesia performed on pediatric patients in the ambulatory hospital location SBUH and the outpatient facility at SDM and reported that 117 minutes and 222 minutes was the average treatment time respectively [16].

The average waiting time to receive general anesthesia was around 67 days, which is significantly lower than a study that was done in Morocco to acquire the average waiting time before dental care under general anesthesia for special needs children that reported an average waiting time of 7.6 months (around 228 days) [17]. On the other hand, Lewis, *et al.* conducted a study targeting pediatric dentistry program directors in the United States to examine the changes over the last 5 years in the characteristics of patient population and waiting times for dental treatment with sedation or general anesthesia. An interesting finding was that mean waiting time from presentation to the dental clinic to the initiation of dental treatment under general anesthesia was 71 days and 28 days for children with non-emergent problems and children with pain and discomfort respectively. This agrees with the current waiting time for pediatric patients receiving dental treatment under general anesthesia in Dubai Health Authority starting from the last Quadrant of 2017 that is 28 days regardless of the disease burden of the patient. Another important thing to note is that the mean number of patients scheduled per week in the Lewis, *et al.* study was 5.5 patients per week while our study found that 9 - 12 patients were scheduled per week [18].

### Conclusion

This study's resultant prevalence's show an evident rise in demands for children undergoing comprehensive pediatric dental care under general anesthesia over a time interval from 2014 to 2017. These demands were subsequently met by Dubai Health Authority's dental pediatric team to reduce essential obstacles such as improving facility utilizations per week, as well as reducing the patients waiting time to receive treatment.

### Bibliography

1. Forsyth AR, *et al.* "General Anesthesia Time for Pediatric Dental Cases". *Pediatric Dentistry* 34.5 (2012): 129-135.
2. Holt RD, *et al.* "The use of general anaesthesia for tooth extraction in children in London. A multi-centre study". *British Dental Journal* 173 (1992): 333-339.
3. Jankauskiene B, *et al.* "Oral health-related quality of life after dental general anaesthesia treatment among children: a follow-up study". *BMC Oral Health* 14 (2014): 81.
4. Savanheimo N, *et al.* "Reasons for and parental satisfaction with children's dental care under general anaesthesia". *International Journal of Paediatric Dentistry* 15.6 (2005): 448-454.

5. Lee GH., *et al.* "Sensitivity and responsiveness of the Chinese ECOHIS to dental treatment under general anaesthesia". *Community Dentistry and Oral Epidemiology* 39.4 (2011): 372-377.
6. Jaimieson LM and Roberts KF. "Dental general anaesthetic trends among Australian children". *BMC Oral Health* 6 (2006): 16.
7. Schroth RJ., *et al.* "Trends in Pediatric Dental Surgery for Severe Early Childhood Caries in Manitoba, Canada". *Journal of the Canadian Dental Association* 80 (2014): e65.
8. Murphy MG., *et al.* "Parental acceptance of pediatric dentistry behavior management techniques". *Pediatric Dentistry* 6.4 (1984): 193-198.
9. Eaton JJ., *et al.* "Attitudes of contemporary parents toward behavior management techniques used in pediatric dentistry". *Pediatric Dentistry* 27.2 (2005): 107-113.
10. Chen Y., *et al.* "A 10-year trend of dental treatments under general anesthesia of children in Taipei Veterans General Hospital". *Journal of the Chinese Medical Association* 80.4 (2017): 262-268.
11. Fukuta O., *et al.* "A Survey of Dental Treatment under the General Anesthesia in Same Day Cases of the Pediatric Dentistry at the University of California, San Francisco". *The Japanese Journal of Pediatric Dentistry* 32.4 (1994): 903-910.
12. Karim ZA., *et al.* "Utilization of dental general anesthesia for children". *Malaysian Journal of Medical Sciences* 15.3 (2008): 31-39.
13. Ozkan AS., *et al.* "Retrospective Evaluation of Dental Treatment under General Anaesthesia". *Turkish Journal of Anesthesia and Reanimation* 43.5 (2015): 332-336.
14. Tsai C., *et al.* "A Retrospective Study of Dental Treatment under General Anesthesia of Children with or without A Chronic Illness and/or A Disability". *Chang Gung Medical Journal* 29.4 (2006): 412-418.
15. Escanilla-Casal A., *et al.* "Dental treatment under general anesthesia in a group of patient with cerebral palsy and a group of healthy pediatric patients". *Medicina Oral Patología Oral y Cirugía Bucal* 19.5 (2014): e490-e494.
16. Rashewsky S., *et al.* "Time and Cost Analysis: Pediatric Dental Rehabilitation with General Anesthesia in the Office and the Hospital Settings". *Anesthesia Progress* 59.4 (2012): 147-153.
17. Badre B., *et al.* "Waiting times before dental care under general anesthesia in children with special needs in the Children's Hospital of Casablanca". *Pan African Medical Journal* 17 (2014): 298.
18. Lewis CW and Nowak AJ. "Stretching the safety net too far: waiting times for dental treatment". *Pediatric Dentistry* 24.1 (2002): 6-10.

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