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**CHARACTERISTICS OF PEDIATRIC DENTAL  
TREATMENT PROVIDED UNDER GENERAL  
ANESTHESIA IN DUBAI, UNITED ARAB EMIRATES -  
A RETROSPECTIVE ANALYSIS**

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## ABSTRACT

Characteristics of pediatric dental treatment provided under general anesthesia  
in Dubai, United Arab Emirates - a retrospective analysis

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**Background:** Dental general anesthesia (DGA) is a widely used technique in pediatric dentistry. Several researchers have examined their DGA cases and tried to pinpoint the primary cause leading to it. Furthermore, factors affecting the success rate of DGA are a widely investigated topic in the literature. However, in the UAE there is a notable paucity of properly conducted studies specifically relating to this subject.

**Aim:** This study was set out to analyse characteristics of dental treatment provided for children under General Anesthesia (GA) and review any differences of treatment between Special Health Care Needs (SHCN) and healthy patients.

**Materials and Methods:** A retrospective analysis was conducted on the data that was collected from the electronic records of all patients who underwent any dental treatment under GA in the period between January 1<sup>st</sup> 2016 up until the 29<sup>th</sup> of February 2020. Data included sociodemographic status of patients, preoperative information such as diagnosis and justification of GA, intraoperative information including treatment details and duration, and post-operative information such as follow-up rates and morbidities.

**Results:** The study population consisted of 98 patients. Majority of the sample were males (62.2%), and the mean age was 5.4 years. 26 out of the 98 children had a medical condition and were categorized as ASA II. Results of the study showed that the most common diagnosis

leading to GA is Early Childhood Caries (ECC) and the most common justification is lack of cooperation due to young age. The study also showed that nearly half the patients missed their one-week, 3-months and 6-months follow-up visits. Further dental treatment was needed for 23 (23.5%) patients which were delivered under local anesthesia in the dental chair. Out of the 23 patient who received further treatment (60.9%) were due to new carious lesions. Four (4.08%) out of the 98 children had a repeat GA episode. SHCN patients received significantly more interventional measures and significantly less pulp therapies than healthy patients. The ratio of fissure sealants was 3.65 sealants per SHCN patient compared to 0.77 sealants per healthy child.

**Conclusion:** A more comprehensive treatment plan which consists of fewer pulp therapies was adopted to treat SHCN children accompanied by a notable increase in preventive interventions when compared to healthy patients. Frequently missing recall appointments following DGA increased the likelihood of developing new carious lesions and consequently increased the need for further dental treatment.

## **DEDICATION**

I dedicate this work to my beloved family.

To my friends and colleagues at MBRU.

To the wonderful staff at DDH.

And to my exceptional supervisors.

Dr. Manal Al Halabi, Dr. Mawlood Kowash, Dr. Iyad Hussein and Dr. Anas Al-Salami.

## DECLARATION

I declare that all the content of the thesis is my own work. There is no conflict of interest with any other entity or organization.

Name: Mohammad Motea Abdo

Signature:

A handwritten signature in black ink, appearing to be 'MMA', written over a diagonal line.

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## ABBREVIATIONS

<b>AAPD:</b>	American Academy of Pediatric Dentistry
<b>ARE:</b>	Adverse Respiratory Events
<b>ASA:</b>	American Society of Anesthesiologists
<b>ASD:</b>	Autism Spectrum Disorder
<b>CNS:</b>	Central Nervous System
<b>CRA:</b>	Caries Risk Assessment
<b>CS:</b>	Conscious Sedation
<b>DDH:</b>	Dubai Dental Hospital
<b>DGA:</b>	Dental General Anesthesia
<b>DHHS:</b>	Department of Human Health Services
<b>DMFS:</b>	Decayed, Missing, And Filled Surfaces
<b>DMFT:</b>	Decay, Missing, And Filled Teeth
<b>ECC:</b>	Early Childhood Caries
<b>ECOHS:</b>	Early Childhood Oral Health Impact Scale
<b>FDA:</b>	Food and Drug Administration
<b>FMOR:</b>	Full Mouth Oral xiiRehabilitation
<b>GA:</b>	General Anesthesia
<b>GCC:</b>	Gulf-Cooperation Council
<b>LA:</b>	Local Anesthesia
<b>MCPQ:</b>	Modified Child Perception Questionnaire
<b>NO<sub>2</sub>:</b>	Nitrous Oxide
<b>NOIS:</b>	Nitrous Oxide Inhalation Sedation
<b>NPBM:</b>	Non-Pharmacological Behaviour Management
<b>OHRQOL:</b>	Oral Health Related Quality of Life
<b>PS:</b>	Protective Stabilization
<b>QOL:</b>	Quality of Life
<b>RCSENG:</b>	Royal College of Surgeons England
<b>RCT:</b>	Root Canal Therapy
<b>RCTS:</b>	Randomized Controlled Trials
<b>RR:</b>	Repeat Rate
<b>SD:</b>	Standard Deviation
<b>SECC:</b>	Severe Early Childhood Caries
<b>SHCN:</b>	Special Health Care Needs
<b>SM:</b>	Streptococcus Mutans
<b>SSC:</b>	Stainless Steel Crown
<b>UDC:</b>	University Dental Clinic
<b>UK:</b>	United Kingdom
<b>US:</b>	United States
<b>WHO:</b>	World Health Organization

## 1. INTRODUCTION

Dental general anesthesia (DGA) is a widely used technique in pediatric dentistry. It facilitates the delivery of proper treatment to children with severe dental decay who cannot cope with treatment in the conventional dental setting due to anxiety or limited cooperation ability (1). There are several indications for DGA in children, but caries is generally the most common cause (2). Occasionally some healthy and SHCN patients require treatment under general anesthesia (GA) due to congenital disorders or traumatic accidents. Even though some risks are associated with DGA, it remains a safe procedure overall (3). DGA comes with a high cost and requires unique equipment; nonetheless, both dentists and parents find it an acceptable way of treating children (4). Several researchers have examined their DGA cases and tried to pinpoint the primary cause leading to it (5)(6). Furthermore, factors affecting the success rate of DGA are a widely investigated topic in the literature (7). A research study suggests that treatment planning for full-mouth oral rehabilitation (FMOR) under GA differs from conventional methods (4). Therefore, this study aims to analyse the characteristics of children who went through general anesthesia for full mouth oral rehabilitation and to investigate treatments delivered and evaluate their outcomes.

## **2. REVIEW OF THE LITERATURE**

### **2.1. DGA in children and its justification**

General anesthesia is a state of a controlled loss of consciousness using both intravenous drugs and gas inhalation (8). Under the influence of anesthetic medications, patients lose the ability to feel any stimulus no matter how painful it is, and the body's natural reflexes are lost as well (9). This state of unconsciousness provides the pediatric dentist with optimum conditions for delivering dental care. Despite this advantage, GA cannot be regularly used without a valid indication. Multiple factors must be assessed to justify putting the child through an episode of GA. These factors are related to both the psychological and medical status of the patient. Severe dental anxiety that impedes a child from receiving treatment in the dental chair is considered one of the main justifications for DGA (10). This anxiety results of a previously traumatic dental or medical experience that rendered the child with extreme fear or, it can simply be a lack of understanding due to young age. Cognitive status also plays a major role in decision-making. Regardless of their anxiety and age, some children may present with conditions that prevents them from receiving conventional treatment such as autism and other similar intellectual disabilities(10). An additional important criterion is the complexity of the surgical procedure. For example, a healthy cooperative child may not be able to cope with the surgical extraction of an impacted supernumerary tooth. Ultimately, an absolute cut-off point to make the decision does not exist; dentists should weigh the risks against the benefits considering the previously mentioned factors (11).

## **2.2. History of GA and risks related to DGA**

Horace Wells was the first dentist to undergo dental treatment under the influence of nitrous oxide back in 1844 by having one of his teeth extracted by a colleague. Thus, the concept of delivering dental treatments pain-free using systemic analgesics was born (12). GA was known as a state of a controlled, reversible loss of consciousness using a mixture of drugs in the liquid and the gas forms. (13). Few describe GA as falling asleep; however, such a statement would be inaccurate since, contrary to sleep, the body's natural reflexes are lost, and the brain is unresponsive to any stimulus no matter how painful it is (14). Ever since Wells' experiment, news worldwide started emerging of dentists using the general anesthesia technique to provide dental care for their patients. Such as an extraction done in London by Dr. Francis Booth in 1846 following a letter he received from his colleague of a similar procedure performed in the United States (US) (15).

Naturally, the number of treatments under GA increased, and concerns regarding the safety of these procedures started to rise (16). A considerable amount of literature has been published on the potential side effects of GA in terms of morbidity and mortality. Nausea and vomiting were the most commonly reported morbidity complication (17). More critical side effects were recorded such as adverse respiratory events (ARE), including laryngospasm, bronchospasm, and oxygen desaturation (18). As reported by Sternberg et al., these ARE were more common in children with asthma and in children who are younger than two years of age (18). As stated by the US Food and Drug Administration (FDA), a more crucial side effect of GA, is neurotoxicity (19). In 2016, the FDA released a statement based on animal experiments that prolonged exposure of children younger than three years of age to general anesthetic drugs can compromise neural development. Fortunately, multiple researchers have proven that single, brief exposure to these drugs presents a minimal risk for neural growth and development (20), (21), (22).

Although it is vastly uncommon, mortality as a result of GA has been reported in the literature. The true incidence of GA-related mortality remains unclear. However, a study by Flick et al. revealed that the cause of death was 88% related to the medical procedure itself rather than the anesthetic drugs (23).

Consequently, different governing bodies, including the American Association of Anesthesiologists (ASA) and the Royal College of Surgeons of England (RCSEng), began publishing guidelines for the safe delivery of GA procedures (24), (25). Today the ASA defines GA as a “drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired” (24).

### **2.3. Causes of DGA in children**

ECC is increasingly recognized as a vital public health concern. Studies over the past two decades have established the cause of caries to be the presence of *Streptococcus mutans* (SM) bacteria on surfaces of teeth (26). SM can easily be transmitted to a baby infant from their mother during breastfeeding and early nursing years. Regardless of age, SM bacteria can demineralize the enamel of teeth by elevating the acidity of the oral cavity through sugar metabolism (26). Accordingly, ECC can begin as early as one year of age, resulting in social and economic suffering for both the child and their family (27). In the adult population, dental caries occur randomly; however, in toddlers and infants, a more characteristic pattern is usually seen (28). Several terms are used to describe this pattern, such as baby bottle caries, baby bottle syndrome, nursing caries, and rampant caries (29). Since this terminology merely focused on the etiology of the disease, a more encompassing term of ECC was chosen in 1994 that would

include the psycho-social, behavioral, and socioeconomic factors (30). Currently, the AAPD defines ECC as the “presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six ” (31). Several attempts have been made to estimate the prevalence of ECC worldwide. A systematic review and meta-regression unveiled caries in the primary dentition of children to be the top 10<sup>th</sup> chronic disease affecting 621 million people globally (32). Public health surveys done in the United Kingdom (UK) back in 2017 revealed that one-third of five-year-old children were affected by dental caries (33). In the Gulf Cooperation-Council countries (GCC), the prevalence of caries amongst children aged 6-16 was reported as high as 64.7% (34). Despite the efforts of prevention, the prevalence of ECC in the United Arab Emirates (UAE) reached up to 83% among five-year-olds with an average decayed, missing, and filled teeth (*dmft*) of 5.1 (35).

### 2.3.1. Impact of dental caries on quality of life

The consequences of ECC are a significant cause of concern. It has been suggested that assessing the child and family’s psychological and socioeconomic influences of oral diseases can better understand its impact on the overall health and well-being (36). While most studies have investigated dental caries as a biological disease, questions have been raised of its psychological significance. Recently investigators have examined the outcome of caries on the psychology of pre-school children and their Quality of Life (QoL) (37)(38)(2). Dental pain can be extremely harmful to children, as research has shown it to be related to undesirable adverse effects on lifestyle (39). Current evidence suggests that the prevalence of dental pain ranged between 7%-22% in pre-school children (40).

Furthermore, dental pain is associated with a 26% increase in the negative impact on the daily life of five-year-old children (41). Abanto et al. reported a significant association between ECC

and a decreased QoL of both children and their parents (42). His results have been consistent with the similar compiling studies conducted by others worldwide (43)(44). Nonetheless, this issue is not reported by all children experiencing carries (45). Freire et al. study demonstrated that difficulties in eating and drinking hot/cold drinks were the most reported impairments (14%). They were followed by uncomfortable sensations while brushing their teeth (12.4%), resulting in inadequate oral hygiene. Other impairments of dental pain consisted of avoiding sports and leisure activities, difficulty talking/speaking, and refrain from smiling due to shame (41). These impairments have further devastating consequences. ECC in two years old children has been linked to a lowered gain of weight resulting in a marked reduction of growth (46). Moreover, disturbance in sleep schedule due to toothache at night leads to an inability to focus at school, reducing the child's self-esteem (47). ECC was discovered to have a direct connection with child abuse (48). As reported by Sheller et al., flawed family relationships enhance the reoccurrence of ECC (6). The utmost concern of ECC is its life-threatening risk to medically compromised patients. For example, a simple dental infection can result in a fatal infective endocarditis episode for children with prosthetic heart valves (49). In light of recent similar studies, child protection services began to consider long-lasting untreated ECC as a sign of neglect and child maltreatment (50).

### 2.3.2. Effect of DGA on oral health-related quality of life (OHRQoL)

The relationship between dental rehabilitation under general anesthesia and its influence on the OHRQoL in children has been widely investigated recently (51). The World Health Organization (WHO) defines health as “a complete state of physical, mental, and social well-being and not just the absence of disease” (52). Based on this definition, health as a concept now incorporates both the physical and emotional aspects of well-being. More specifically, the WHO describes human QoL as "perceptions of their position in life in the context of culture

and value systems in which they live, and in relation to their goals, expectations, standards, and concerns” (53). Back in the '70s, indices that measured the quality of dental treatment (Restorations, Extractions, and Root canal treatments) were abundant; however, very little attention was paid to the social influence of this service on patient's lifestyle (54). Cohen endorsed the need for what he called “Socio-dental Indicators “. Subsequently, attempts have been made to create tools that would facilitate the measurement of OHRQoL. In 2000, the US Department of Human Health Services (DHHS) published a report describing how people's oral health influenced their social life and self-esteem (55). Many psychological aspects started unraveling as a result of this great interest in OHRQoL.

A study reported that optimistic people were far more able to cope with illness than pessimistic individuals (56). Sisco et al. constructed a model that clarifies how OHRQoL can be assessed (57). Many factors were included in this design to link oral health to the overall QoL. One of the studied correlations was the extent of oral disease (e.g., caries) to function (chewing, speaking). Another example is the effect of oral-facial image on a psychological state. One arm of the design examined the reverse relation between social life and oral health; it consisted of studying how environmental elements (family, school, jobs) influenced seeking dental care (57).

Rane et al. used the Early Childhood Oral Health Impact Scale (ECOHIS) on children who underwent dental treatment using local and general anesthesia. They found a significant improvement in sleeping and eating habits (58). A Lithuanian study used the same scale to follow up to 122 participants who required dental treatment. They also reported a significant increase in QoL, especially amongst boys (59). El-Meligy et al. implemented a modified child perception questionnaire (MCPQ) in a (before and after) design study (60). Their goal was to enhance QoL in special health care needs children FMOR under GA. They declared a vast increase for both patients and their families. In the UAE, similar results have been reported of

an immense boost in social, physical, and psychological QoL for children who received dental treatment under GA (51). Ultimately a meta-analysis encapsulated the evidence presented above and reinforced the statement of improved QoL after FMOR under general anesthesia (61).

### 2.3.3. Dental Treatment in Pediatric Dentistry

#### *Caries risk assessment*

During treatment plan formulation for the pediatric patient, multiple factors must be taken into consideration. Caries Risk Assessment (CRA) is considered the first and most critical step in treatment planning. Assessing the child's risk of caries will tailor the strategy of prevention and facilitate choosing the most appropriate treatment modality. Children can be categorized into three main categories; low risk, moderate risk, and high risk (62). Determining on which level the patient is placed cannot be done in a quick one-time test on the dental chair. Instead, it is a long process of analyzing the child's diet, examining the quality and quantity of their saliva, quantifying SM bacteria's level if possible, and most importantly reviewing their past caries experience (62). However, most of the caries-risk tests are not carried out routinely. Multiple factors also exist, such as age, manual dexterity, and medical status.

#### *A. Diet*

Sugar is determined to be one of the most crucial factors in the development of dental caries. Current evidence suggests that the frequency of sugar consumption is far more devastating than the amount ingested (63). Hence, sleeping with the milk bottle, continually using the Sippy cup for juices and frequent sugary snacking between meals are considered poor dietary habits.

### *B. Parents level of education*

Studies of CRA show the importance of parent's education and their caries experience concerning the risk of their children. Since SM bacteria is the main reason for initiating dental decay, mothers are considered the primary source of transmitting this bacterium. A study in India demonstrated inverse correlation between ECC and parent's education level (64). It has also been reported that ECC was 22.5 times higher in children whose mothers experienced dental cavities (65). In the UAE, a study by Noura et al. revealed that mother's level of education was a significant factor influencing the oral health of their children (66).

### *C. Medical status*

When it comes to the body's resistance to dental decay, the Saliva plays an important role. As repeatedly proven in the literature (67), Saliva can neutralize acidity and elevate the oral environment's PH back to the optimum level after consuming acidic foods and drinks. It is also established that saliva contains several antimicrobial agents that possess the ability to inhibit bacterial growth (68). Accordingly, patients are classified as a high caries risk if they suffered from any medical condition that affects the quality and quantity of saliva such as diabetes and Sjogren's syndrome (69).

## **2.4. Process of DGA**

When a dentist decides that GA is indicated, the first and most crucial step is obtaining informed consent (25). To do so, parents must be aware of all aspects related to the procedure. First, it should be clarified that the GA will be carried out by a specialized anesthetist rather than a dental surgeon. Plus, the procedure will be performed in a theatre with the presence of an experienced medical team. Secondly, risks and possible complications must be thoroughly explained to the parents. It is highly important to convey the information in a systematic, yet

brief manner. The dentist should ask questions to assess the emotional state of parents to choose the appropriate words for the conversation. More importantly, parents should be encouraged to ask questions regarding their concerns rather than receiving all the information in bulk from the dentist. Once the parent or guardian consents, a comprehensive treatment plan must be designed to ensure a successful outcome and prevent the need for a repeated DGA (25).

## **2.5. Behaviour management techniques alternatives to GA**

### **2.5.1. Basic behavior guidance**

Throughout time, providing dental care to children has always proposed various challenges. Pediatric dental surgeons are expected to diagnose and treat Early Childhood Caries (ECC) to the best of their proficiency and within the skills obtained during their specialization period. However, besides the biological aspect, a significant role of the pediatric dentist is assessing the child's developmental anxiety levels and attitude towards receiving dental treatment.

Physical disability, mental impairment, severe anxiety, medical conditions, and age are factors that may influence the child's behavior and compliance. For the dentist to treat a child, he must build rapport and trust with their patient. Such a relationship of trust is initiated by identifying child behavior, showing empathy, and acknowledging their concerns. This process aims to mitigate the child's anxiety to provide proper care and guide the youngster into a positive attitude towards future dental treatment. Since every individual has a different attitude and rationale to reject treatment, various Non-Pharmacological Behavioural Management (NPBM) techniques exist to bypass such an obstacle. These methods must be used in a continuum and should be specifically tailored to the needs of each person. Examples of NPBM techniques are the Tell-Show-Do, Modelling, Distraction, and many others (70). While most patients can be managed using the previously mentioned means, a minority of children might need a more advanced approach to manage their behavior.

Even though it should not be the first choice, Protective stabilization (PS) remains a way of dealing with an uncooperative individual. It is defined by the American Academy of Pediatric Dentistry (AAPD) as the “restriction of patient's freedom of movement, with or without the patient's permission, to decrease the risk of injury while allowing safe completion of treatment” (9). Stabilizing the child can be done using specialized equipment made for this purpose or by assistant personnel. However, PS has multiple disadvantages in both the physical and psychological aspects. Physically the straps used to stabilize the patient’s chest can sometimes limit respiration. The AAPD also reported that psychological damage such as loss of dignity is a possibility with this technique. Given the drawbacks mentioned above and the caregivers' apprehension of its emotional impact, the use of PS remains a public concern (71).

#### 2..5.2. Advanced behavior guidance

In case none of the NPBM techniques succeed, Nitrous Oxide Inhalation Sedation (NOIS) can be tried next. Nitrous Oxide (NO<sub>2</sub>) is a colorless odorless gas that, when appropriately administered, can produce an anxiolytic effect (72). The NOIS technique consists of inhaling the NO<sub>2</sub> gas through a nasal mask tightly placed on the patient’s nose. The inhaled gas possesses a depressing effect on the Central Nervous System (CNS) (73). This depression results in a state of euphoria, which in turn alleviates anxiety and reduces fear. NO<sub>2</sub> also increases the pain threshold, therefore, reducing sudden unwanted child movements (74). Ultimately NOIS enhances patient cooperation, improves communication, and renders the treatment comfortable for the child.

When all previously mentioned measures to control a child's behavior fail, GA prevails to be the last option to deliver necessary dental care. Having the child under the influence of GA provides the optimum conditions for the dentist to provide proper treatment. It has been shown that restorations placed under GA had a longer life span and a higher success rate than

restorations placed in the conventional dental setting (75). Nonetheless, When deciding to treat a child under GA, multiple factors must be taken into consideration, of which, whether all other less invasive modalities have been tried and deemed unsuccessful, analyzing the risks of the procedure over the benefit and the medical condition of the child (9). Such careful planning and restrictions exist due to the abundant evidence revealing the potentially harmful side effects of drugs used in the induction of GA (76).

## **2.6. Treatment planning for DGA**

The most common pediatric dental treatment are simple restorations, Stainless-steel Crowns (SSC), and extractions. Each modality has its indication and success rate. However, more than one option can be used to treat the same condition, e.g., a none-pulpally involved tooth with decay can be treated either with a restoration or an SSC. Another example is that a pulpally involved tooth treatment option can be either extraction or Root Canal Therapy (RCT). The decision on which treatment option to use depends on several factors including, medical status, age of the child, financial capability. Before treating a child under general anesthesia, careful planning should be undertaken by a pediatric dentist (77). Each tooth must be treated with the best available evidence to ensure a high success rate. Even though GA provides the optimum condition for the delivery of dental care, a study suggested that caries recurrence is higher in children who were treated under GA (78).

Moreover, the cost of the GA procedure is considered relatively high by most parents (79). Besides being preventable, repeating a GA procedure is a highly unpleasant possibility (77). Exposing the child to another episode of GA increases the risk of morbidity and even mortality in addition to the overwhelming emotional and financial burden on their parents (80). Failure to accommodate a comprehensive treatment plan and lack of long-term prevention strategies are the most common reasons for the repeat rate of GA (25). Repeating a GA is common for

children with a medical or mental disability that prevents them from conventionally receiving treatment (5). To that end, a treatment plan ought to be designed to prevent the possibility of future sepsis and reduce the chances of secondary caries as much as possible.

## **2.7. Repeat Rate of DGA**

Recent trends in DGA have led to a proliferation of studies measuring the repeat rate (RR) and its causation. Its significance lies in the increased mortality and morbidity risks in children. One study reported that children who have undergone DGA are more likely to need another similar procedure in the near future (81). Kakaounaki et al. recorded an 8.9% repeat rate of DGA, of which most repeats were in the first 12 months of the procedure (82). Several similar studies have also investigated this issue, eventually sparking the need to analyze the causing factors. Sheller et al. examined the characteristics of children who received two episodes of DGA and concluded the following features as high-risk indicators; continuous use of a nursing bottle, unsupervised tooth brushing at a young age, persistent uncooperative behavior in the dental chair, and parents education level (6). Another factor that seemed to play a significant role in RR is the compliance of parents with follow-up appointments (75).

Moreover, the medical status of the child was reported as a high-risk indicator. As stated by one study, medically compromised patients in need of a DGA will probably need another operation within four years (5). Henceforth, prevention of repeat has long been a matter of utmost value (77).

While high-risk indicators have been emphasized in the literature, the reasons for successful outcomes are of equal significance. Intention to prevent another episode of GA is a crucial step in treatment planning before commencing the procedure. Three main elements have been attributed to a high success rate of dental treatment under GA; frequent follow-up appointments, educating parents, and an aggressive approach for caries management (6).

## **2.8. Parental Acceptance**

It is well established that in order to treat a dental child patient, one must implement one or more behavioral management technique that is appropriate to the age and developmental level of the patient. As mentioned earlier, multiple NPBM techniques exist to help shape behavior. When these techniques fail, more advanced solutions can be used, such as PS, NOIS, and GA. However, what remains a challenge is parent's acceptance of the dentist's approach. Researchers, on several occasions, investigated the parental perception of pharmacological and non-pharmacological behavioral management techniques. Eaton et al. showed that tell-show-do was the most accepted approach by most parents, followed by NOIS, GA, and PS, respectively (83). Another study reported that GA was the least accepted method compared with eight different NPBM techniques, including the use of NOIS (84). His results were consistent with Boka et al., where GA was also reported as the most rejected technique by parents (85). That being the case, convincing parents that GA is in their child's best interest always proposed a challenge to the pediatric dentist. In the case of emergency treatment, parents' attitude towards GA was slightly more favorable. It was found that as the urgency of the treatment increased, so did the parent's approval of the procedure (86). Many other factors seemed to influence the decision of caregivers. Reports from a Chinese survey expressed that parents were more likely to consent to a GA when the child required frequent dental visits (87). Additionally, a significant relationship was found between parent's acceptance and a history of previous GA (88). Parents were more likely to accept the option of GA when their child has had an episode of GA previously.

## **2.9. Characteristics of DGA**

### **2.9.1. Analysis of dental treatment provided**

As demonstrated earlier, the aggressive caries management approach is a critical factor for a successful outcome of FMOR under GA. Thus, the analysis of dental treatment delivered under GA provides a useful overview of how well pediatric dentists are complying with this principle. A considerable amount of literature has been published on this matter. For example, Tahmassebi et al. screened the records of 263 DGA procedures that took place at a teaching hospital in England and concluded the following. The need for further dental treatment was significantly higher in medically compromised patients rather than healthy ones (89). Additionally, in their (12.9%) reported repeat rate, 71% belonged to children with medical disabilities, and seven out of ten repeated cases were due to new carious lesions. This confirms the fact that children with chronic medical conditions are at a higher risk for caries development and, subsequently, more likely to go through DGA.

The same study revealed that during the repeated DGA, extractions were significantly more frequent than restorations. The authors stated that in healthy children, nine cases (26.5%) of repeated treatments under GA were due to restorative treatment failure and could have possibly been avoided if a more aggressive caries management approach was implemented. One more valuable finding was that out of 263 patients, only 177 returned for their first follow-up appointment. Failure to attend after the GA contributed to new caries development and the need for further treatment. The author also stated that lower repeat rate could have been achieved if the follow-up rate had been higher and more preventive measures were conducted.

Takriti et al. (2019) compared characteristics of dental care provided under GA between private practices and a university dental clinic (UDC) at Greifswald, Germany. A comparison of the two institutions revealed extractions to be more prominent in the UDC, while private practices favored restorations (90). Also, private specialized centers carried out more root canal therapies

and SSCs than the UDC. The authors argued that this could be due to economic reasons or the difference in the severity of cases. Intensive prevention was delivered during follow-up appointments in the UDC as opposed to private practices, which consisted of consultations only. The single most striking observation to emerge from the data comparison was the retreatment rate. As quoted by the authors of the German study, the retreatment rate at the UDC was 1% in two years, while private practices' retreatment rate reached up to 70%. This result is somewhat disappointing, and Takriti et al. postulated this as an apparent quality concern.

Detailed analysis of the dental treatment of SHCN children under GA was presented by Mallinen et al. (2015). After searching the literature, 10 out of 71 studies were eligible for inclusion in his review. Data examination spotlighted gender to be disproportionate. Males were higher in number than females in almost all studies but one (91). Treatment modalities were in favor of restorations rather than extractions. And the Follow-up rate was reported as low as 2% in some studies.

Furthermore, the DGA repeat rate ranged from 7-10%. One study reported that 3% of their cases received a third DGA (92). As per the author's opinion, such finding can be attributed to the lower follow-up rate or to the medical condition itself. The duration of treatment was recorded to be slightly higher in SSC cases, while extractions took less time. However, this difference was found to be statistically insignificant. Surprisingly, some clinicians scheduled the first follow-up appointments two months post-operatively while others scheduled the post DGA follow-up four and even six months post-surgery.

With the incidence of a third DGA and the inconsistency of appointment scheduling, the authors advocate formatting a standard follow-up protocol for SHCN.

### 2.9.2. Cost efficacy

It is not uncommon to treat ECC in the dental chair. Some children might cope with complex treatment using the conscious sedation technique regardless of their young age. However, a child's behavior can be very unpredictable, and attitude can quickly shift from positive to negative at a glance (93). Unusual sensations sometimes are misinterpreted by the patient as pain, and cooperation is more likely to be lost mid-session. To avoid compromising the treatment and possibly a traumatic experience to the patient, evidence showed that a child with ECC who requires complex dental care would benefit from a single episode of FMOR under GA rather than multiple visits using NOIS. This view is supported by Fuhrer et al. (2009), who compared behavior at future dental appointments between patients treated under GA and conscious sedation (CS). He concluded that behavior towards dental treatment was improved at 6,12 and 18 months in the group who received treatment under GA (93). He further added that future attitudes should be considered when deciding on the best option to manage caries in children.

One major issue in utilizing the GA treatment option approach is its financial aspect. One observer has already drawn attention to this paradox in a cost-efficacy comparison between a single GA procedure vs. three CS visits to treat ECC in three-year-olds (80). The results of his study concluded the following statement: 'Comprehensive severe early childhood caries (SECC) treatment had better outcomes when performed under GA versus CS. However, GA did not reduce cost when compared to CS'. Similarly, Jameson (2007) found that GA was 46.6% more costly than CS (94). In contrast, Lee et al. noted that when CS visits exceeded 3.6 appointments, the cost would then surpass GA's (95). This dissimilarity could be attributed to the large timeline gap between the previously mentioned studies.

### 2.9.3. Post-operative complications and morbidity.

Even though conditions are optimum, and the child's behavior does not compromise treatment, complications post-surgery is very common and frequently reported. Parents must maintain superb home care to ensure that comorbidities are as low as possible. Due to the minimal interaction with the patient during the first couple of days following the operation, dentists are unable to supervise parents with this task. During this period, reporting symptoms is essential to make sure nothing out of the ordinary has occurred. It is, therefore, the dental surgeon's responsibility to convey precise, accurate post-operative instructions and confirm that parents are aware of all possible outcomes. To do so, pediatric dentists are expected to be highly knowledgeable about potential adverse events. To date, a large volume of published studies exists describing the sequelae of FMOR under GA. Data from several sources have identified pain as the most commonly reported post-operative symptom (96),(97). Factors thought to be influencing pain have been intensively investigated in a prospective cohort study (98). Multiple elements associated with the increased prevalence of pain were concluded as follows. Children who underwent multiple extractions reported pain more frequently than children who received other treatments. The pain was experienced more in children who have had more than 11 procedures. With respect to age, patients of 4 years and older expressed pain more frequently and often required analgesics.

Regarding duration, the pain was felt mostly during the first day after the surgery, while symptoms gradually decreased in the following two days. Eventually, the complaint disappeared on the fourth and fifth days. Concerning the type of intubation, patients who were nasally intubated had more considerable pain immediately post-surgery and complained of sore throat more commonly than orally intubated children. Surprisingly, parents' education seemed to be a contributing factor. Less-educated parents more often reported that their children felt pain.

Atan et al., added sleepiness, nausea, and weakness as a common post-operative side effect (97). Sleepiness and weakness were noticed to be significantly related to both duration of anesthesia and gender. These symptoms were experienced more in females and more in lengthy procedures.

Some children reported further symptoms in the first 24 hours following the surgery, such as vomiting and diarrhea (99).

#### 2.9.4. Local anesthesia effects on DGA post-operative pain

Pain as previously mentioned is predominantly the most reported post-operative symptom in the literature following FMOR under GA. Since the exact cause of this incident could not be pinpointed, the use of Local anesthesia (LA) intraoperatively or systemic analgesics as a pain management supplement to general anesthetic drugs is indicated. This concept dated to 1913 when it was first suggested by George W. Crile, who was considered the pioneer of this approach (100). He believed that the administration of systemic analgesics prior to the induction of GA could reduce the amount of general anesthetic drugs needed, (given that less sensory information will be transmitted to the CNS), thereby making the procedure safer. He also assumed that this might help in a speedy recovery with less post-operative pain. His hypothesis generated a substantial amount of research to try and prove the efficacy of this technique.

One animal experiment tested this theory and suggested that pre-operative blocking of peripheral nervous stimuli can reduce postoperative pain (101). This technique was further tested on orthopedic patients going through GA, and it was found that a combination of pre-operative morphine and intraoperative LA significantly delayed the need for analgesics postoperatively (102). In oral surgery, a placebo group was compared to a pre-operative ibuprofen administration group during surgical extraction of wisdom teeth. The experiment

demonstrated that the placebo group had significantly higher pain and discomfort in the first 48 hours (103).

On the contrary, negative adverse events were documented in some cases. Based on the results of a review by Kaufman et al., they advised the administration of LA during FMOR under GA in children as it was shown to decrease postoperative pain (104). At the same time, Leong (2007) found that postoperative pain was not affected by the administration of LA intraoperatively (105). Some researchers examined the effect of this technique on the recovery quality and found it to be of no added value (106). In contrast, Watts et al. demonstrated an increased vital signs stability of children during recovery with less need for the anesthetist intervention (107). One study reported that utilizing intraoperative LA increased the odds of developing dizziness (99). This view was supported by Needleman, who noticed elevated agitation in children during recovery when LA was used (108). He also reported that children had a higher risk of soft tissue trauma due to numbness. Owing to the heterogeneity of the evidence, dentists have long debated whether to use or not use this technique in their practice, and opinions often varied.

Few published studies have measured the adherence of both dentists and anesthesiologists to this method. A 2014 survey by Townsend et al. revealed that 91% of dentists use LA while performing FMOR under general anesthesia; however, 40% of them reported using it only on rare occasions (109). When asked about the reason for using LA, the most common response was vital signs stabilization, improved patient recovery, and control of bleeding. Part of the survey aimed to determine which procedures encouraged implementing this approach, and almost all answers were 'during the extraction of either permanent or primary teeth.' Lidocaine was the preferred local anesthetic drug (85%) followed by articaine (7.9%), while the remaining participants had no preference. 96.8% administered the LA before extraction, while others preferred to do so after the procedure, and Infiltration was almost always the chosen

technique. Dentists who did not administer LA were further asked about their rationale. Their justification was to 'avoid traumatic lip-biting' due to numbness, and their belief that no significant value was added in the presence of systemic general analgesic drugs.

Research on LA administration during GA has been descriptive in nature, and to the author's knowledge, no randomized controlled trials (RCTs) have been conducted up to date. Most of the published articles have suffered from a paucity of standardized measures and failed to control relevant confounding factors.

The Cochrane Library published a review summarizing the literature. It declared that the currently available evidence is insufficient to draw solid conclusions, and further, well-designed RCTs are needed to assess the true effect of this method (110).

#### 2.9.5. Risk factors leading to DGA

Despite it being preventable, ECC is a common chronic disease of childhood. It is now well established that it can cause vast impairments in different aspects of children's lives. When a very young child suffers oral decay early in their life, GA often remains the only option available for treatment. National surveys by the Canadian Institute for Health Information revealed pediatric DGA to be the most common day-case procedure performed (111). Schroth et al. believed that analyzing DGA cases can help identify risk factors associated with this phenomenon and perhaps decrease its prevalence (112).

Factors thought to be influencing the rate of DGA have been explored in Schroth et al study and categorized into prenatal, maternal, and early childhood factors (112). Results demonstrated that children were more likely to go through a DGA early in life when their mothers smoked during pregnancy. The study also reported that breastfeeding was found to be a significant factor, increased need for DGA was found in children who were not breastfed.

Furthermore, mothers conceiving at an older age were more likely to treat their children under DGA.

As anticipated, low financial income was associated with an increased odd for DGA. This was also the case for families living in rural areas. The author relates this to the difficulty in accessing dental care for these patients (112).

In summary, pediatric DGA has been a widely investigated topic in the literature. However, in the UAE there is a notable paucity of properly conducted studies specifically relating to this subject. Therefore, it seemed valuable to conduct this research to expand our knowledge and compare the available data with the global literature.

### 3. AIM

The main purpose of this study is to investigate the different characteristics of dental treatment provided for children under GA, in a group of patients treated at a tertiary affiliated dental hospital in Dubai, UAE.

The secondary aim is to compare the differences between healthy and SHCN patients in the same group.

The first hypothesis is that ECC and severe anxiety towards dental treatment are the main factors leading to DGA. The second hypothesis is that SHCN children receive more preventive interventions than their healthy peers, and have more aggressive treatment plans for oral rehabilitation under GA. It is also speculated that patients who miss their regular follow-up appointments tend to need further dental treatment after their DGA. The final hypothesis is that DGA is a safe procedure with minimal post-operative complications and morbidity.

Specific objectives:

1. To determine the main factors leading to DGA in a group of children
2. To compare modalities of treatment between healthy and SHCN patients.
3. To measure the repeat rate of DGA.
4. To assess the attendance rate to follow-up appointments following DGA
5. To investigate the correlation between attendance to follow-up appointments and further dental treatment needs
6. To review the post-operative complications and morbidities.
7. To investigate the sociodemographic status of patients going through DGA
8. To analyze characteristics of the dental procedures delivered.

## 4. MATERIALS AND METHODS

### 4.1. Study design and population

This study takes the form of a descriptive-analytical design. The study protocol was approved by the Mohammad Bin Rashid University Institutional Review Board (Ref: MBRU-IRB-2020-007). The research data in this study was extracted from the records of all children who went through full mouth oral rehabilitation or any dental treatment that required GA in the period between January 1st, 2016 – February 29th, 2020, at Dubai Dental Hospital (DDH), UAE. These procedures were performed as an inpatient day case surgery by residents of a pediatric dentistry postgraduate program.

### 4.2. Data collection and patient categorization

To acquire the information needed for this analysis, a retrospective review of the electronic records was utilized. The data was obtained manually for all patients who have had a DGA in the previously specified period at the DDH. **Demographic** data such as age, gender, and nationality, were obtained from the formal patient file that is completed and signed by the patient's guardians before admission to DDH. **Pre-GA information** such as diagnosis, indication, justification, medical history, and date of the DGA was gathered through the standardized surgical booking form completed by the surgeon on the day of the operation. **Post-GA information** such as follow-up attendance rate, postoperative complication, and the need for further treatment were collected from the operating dentist's clinical notes in the subsequent follow-up visits. **Details of the surgery** were also retrieved using the post-operative discharge form which contains the total duration, characteristics of treatments provided (crowns, extractions, restorations, etc.), and adverse events, if any.

According to the ASA physical status classification system, the medical status of patients was categorized as showing in Table 1 (113).

Children with ASA I were considered as healthy individuals, while others with ASA II and above were listed as SHCN patients.

Table 1 ASA classifications

<b>ASA category</b>	<b>Definition</b>
ASA I	A normal healthy patient
ASA II	A patient with mild systemic disease
ASA III	A patient with severe systemic disease
ASA IV	A patient with severe systemic disease that is a constant threat to life

Justification for GA was grouped into five main categories: *pre-cooperative*, *anxiety/dental phobia*, *complex surgical procedure*, *condition* impeding conventional dental treatment, and dental emergency. Children whose cognitive ability was immature due to young age and communication could not be established with, were defined as pre-cooperative patients. According to the clinical notes, older children who were showing no signs of cooperation towards treatment were listed as anxious. ‘Complex surgical procedure’ was assigned to cooperative patients but due to the invasive nature of the treatment, the surgeon decided that absolute compliance was necessary to avoid substandard outcomes that could result from the sudden loss of cooperation for example, surgical extraction of a bony impacted supernumerary tooth in cooperative nine years old. The fourth category was given to patients who suffered a condition that renders them unable to receive conventional dental treatment such as (but not limited to) autism and cerebral palsy. Lastly, children who required immediate dental intervention where time did not allow for behavior management were justified as an

emergency. For example, a slightly anxious patient with diffused cellulitis is a constant threat to life requiring immediate intervention.

#### **4.3. Intra-examiner reproducibility**

Two cycles for intra-examiner reproducibility testing performed on 10% of the total sample population. A random number generator randomly selected ten patients' records to calculate intra-examiner reproducibility using the kappa test. The two recording cycles were separated by a period of 10 days.

#### **4.4. Statistical analysis**

The IBM SPSS software version 25 (SPSS Inc., Chicago, IL, USA) was used to analyze the data using descriptive statistics.

The normality of the available data was tested using the Kolmogorov-Smirnov test. Since the data was not normally distributed, the Mann-Whitney U was used as a non-parametric statistical test to compare independent groups at a level of significance set as 5%.

Descriptive statistics were used to calculate the mean duration of procedure and *dmft*. While categorical variables such as age, gender, medical condition, etc. were plotted using frequency tables. Cross tabulations Chi-square test was used to compare differences between SHCN patients and their healthy peers.

## 5. RESULTS

### 5.1. Demographic data

Data were collected for a total number of 98 patients who had undergone DGA at DDH in the said period. The sociodemographic characteristics are presented in Table 2. More than half of the sample population were males 61 (62.2%) and 37 patients were females (37.8%).

Due to the wide range of patient's nationalities, they were sub-grouped into two main categories, Emiratis, and expats. Local Emirati patients consisted of 42 (42.9%) while the remaining 56 (57.1%) patients were of expatriate nationalities.

Patients' age ranged from 1-15 years old with a mean age distribution of 5.4 years and a standard deviation of  $\pm 2.8$  years.

Table 2 Demographic distribution

<b>Variables</b>	<b>Nr (%)</b>
<b>Gender</b>	
Male	61 (62.2)
Female	37 (37.8)
<b>Nationality</b>	
Emirati	42 (42.9)
Expats	56 (57.1)
<b>Total</b>	<b>98 (100%)</b>

## 5.2. Duration of treatment under anesthesia

Table 3 shows the mean duration of treatment under GA was 97.14 minutes with a standard deviation (SD) of  $\pm 26.6$  minutes.

Table 3 Duration of treatment under anesthesia

	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD</b>
<b>Duration</b>	98	30	135	97.14	26.6

*Note: duration measured in minutes*

## 5.3. Trend of patients

Patients' numbers seemed to be slightly increasing annually during the years from 2016-2019. Patients from 2020 were not included in this figure as the research sample included only those who have had a GA up until February 2020. Figure 1

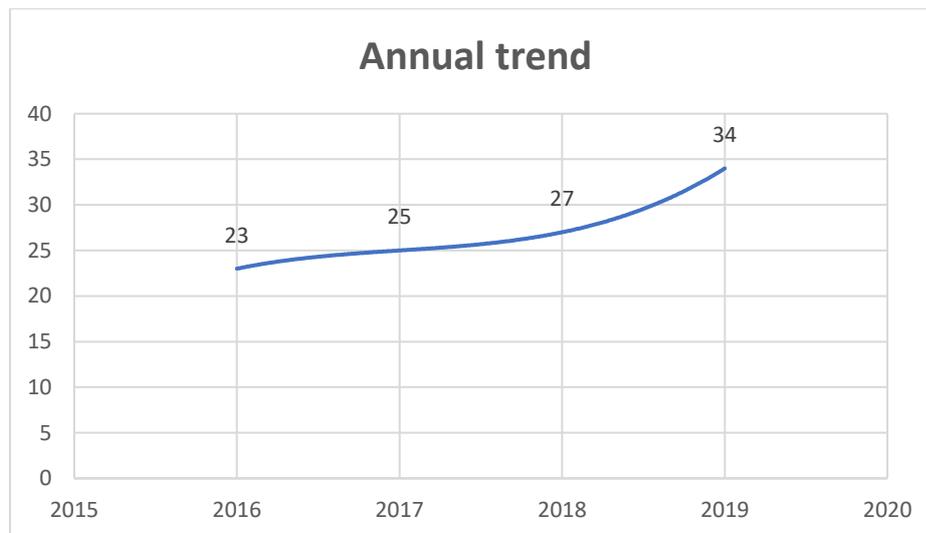


Figure 1 Annual trend in the number of patients

## 5.4. Reasons for general anesthesia

Several reasons justified managing these children under GA. Five main categories were recorded in the patient's files included in this study as shown in Figure 2. These included young pre-cooperative children 44 (44.9%), severe anxiety and refusal of treatment 23 (23.5%), conditions impeding conventional dental treatment 19 (19.4%), an emergency requiring

immediate intervention 7 (7.1%), and complex surgical procedure which requires absolute cooperation 5 (5.1%). Further analysis was conducted to determine which systemic condition was the most common leading to GA (see section 5.11).

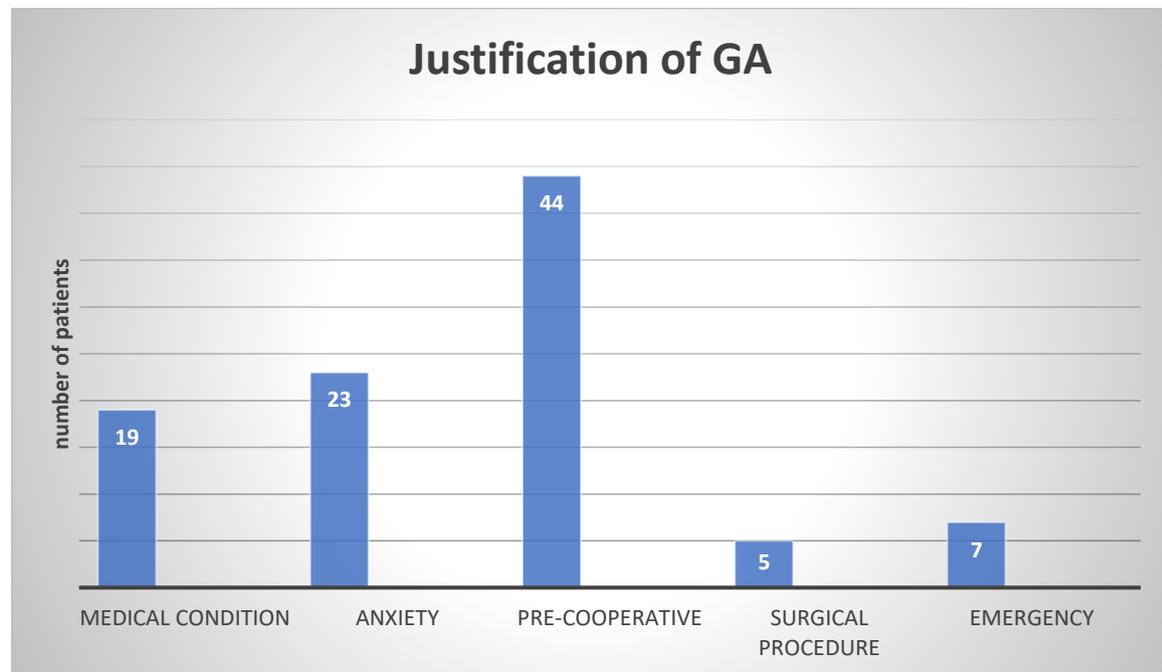


Figure 2 Indications of DGA as recorded in the clinical notes.

### 5.5. Dental diagnosis leading to general anesthesia.

Data were analyzed to identify the main dental diagnosis leading children to need a DGA as shown in Table 4. The 98 patients' needs ranged into seven different diagnoses. The most common cause was SECC 85 (86.7%), life-threatening cellulitis consisted of 5 (5.1%) cases, three patients (3%) had a supernumerary tooth, two patients (2%) had facial and dental trauma, while two patients (2%) had periodontal disease, and one patient (1%) was diagnosed with amelogenesis imperfecta. Out of the 98 patients, 58 (59.2%) presented with pre-operative pain as the main complaint while the remaining 40 (40.8%) did not report pain as a symptom.

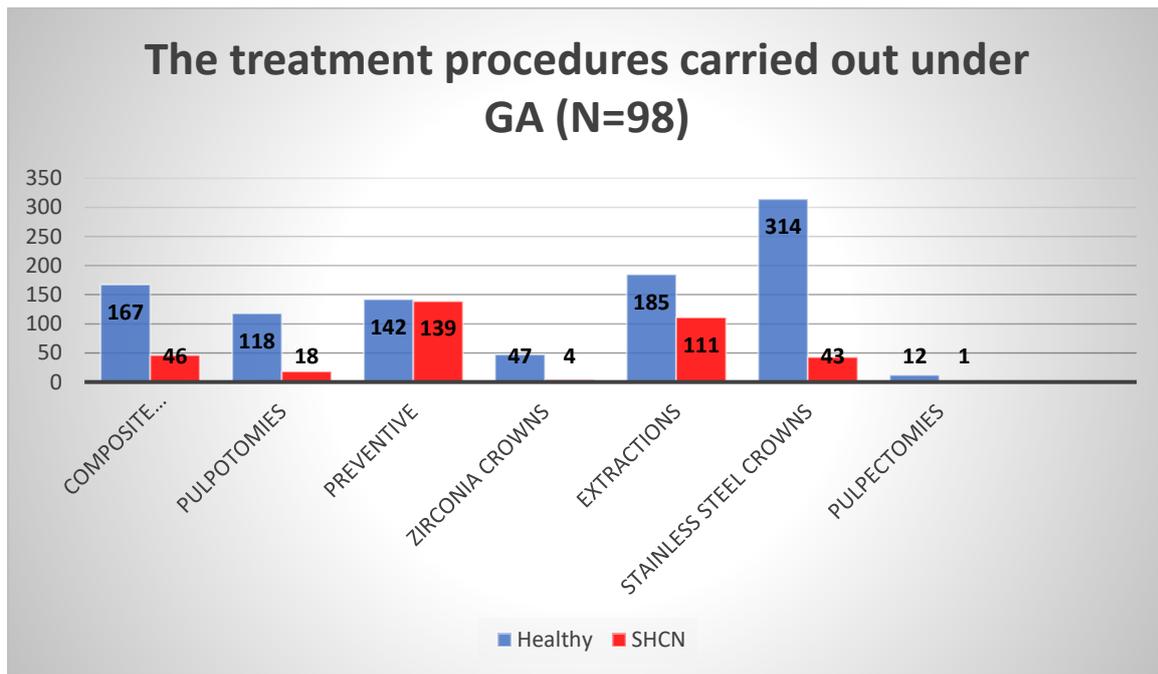
Table 4 Dental diagnosis

Diagnosis	N (%)
SECC	85 (86.7%)
Cellulitis	5 (5.1%)
Supernumerary tooth	3 (3%)
Trauma	2 (2%)
Periodontal disease	2 (2%)
Amelogenesis imperfecta	1 (1%)
<b>Total</b>	<b>98 (100%)</b>

### 5.6. Type of treatment procedures

Different treatment procedures were delivered for the 98 children. They ranged from preventive, restorative to surgical procedures. As Figure 3 below shows, a total of 1347 treatment procedures of which 357 (26.50%) pre-formed SSCs, 296 (21.97%) were extractions, 213 (15.81%) composite restorations, 136 (10.10%) pulpotomies, 51 (3.79%) zirconia crowns, 13 (0.97%) pulpectomies, and the remaining 281 (20.86%) were preventive treatment procedures in the form of sealants, fluoride, and full mouth prophylaxis. Further analysis of preventive treatment procedures showed that 70.4% received full-mouth scaling and polishing at the beginning of the treatment. And 51% of children received topical fluoride varnish during operation. While space maintainers were fabricated for only 14.3% of patients.

Figure 3 Types of treatment procedures



### 5.7. Attendance rate to follow-up appointments

Following the DGA, a standard follow-up schedule is planned for all patients. It consists of a visit one week postoperatively, three- and six-months post DGA. Overall, 27 (28%) patients missed all their follow-up appointments and were never seen after the procedure.

The pattern of attendance to the follow-up program was analyzed as shown in Figure 4. Out of the 71 (72%) patients who were seen at least once after their DGA, almost half (48%) of the patients did not attend their one-week follow-up appointment. Failing to attend the three-month follow-up visit was noticed in almost half of the patients as (49%) missed their follow-up session. Lastly, upon checking the attendance of the six-month appointment, it was noticed that (59.2%) of patients did not come back for their routine check-ups.

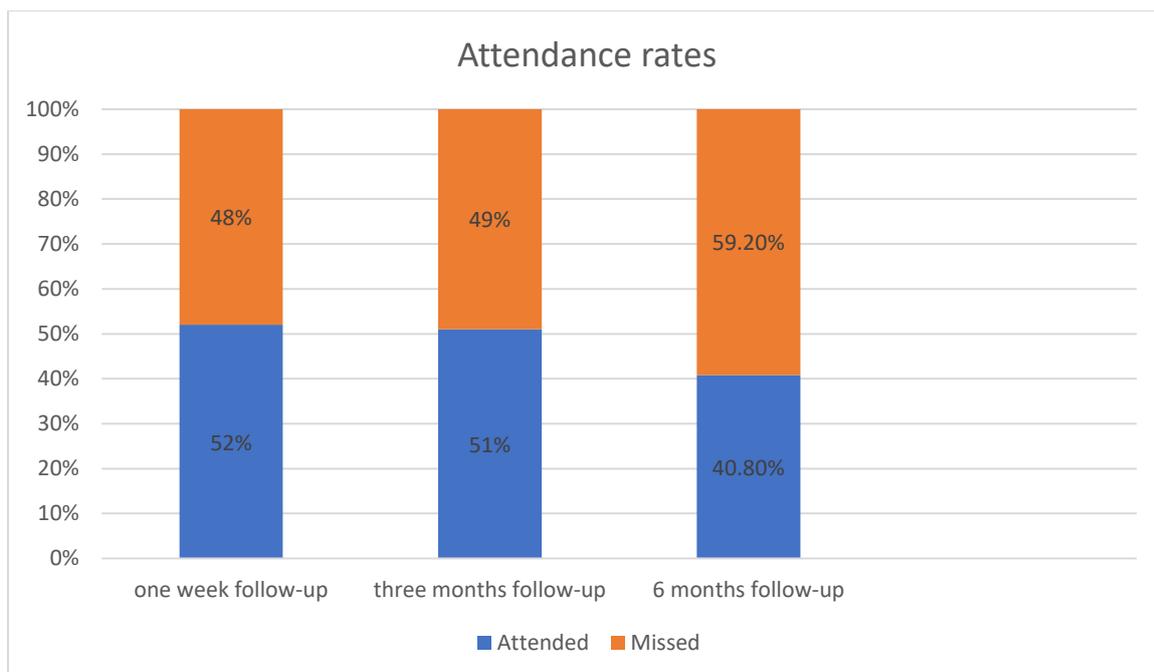


Figure 4 Attendance rates

### 5.8. Need for further dental treatment

The files of all patients included in this study were checked from the date of the DGA until the date of the last time they were seen in the clinic. The duration of follow-up between patients ranged from 2 to 55 months with a mean of 16.2 months and a standard deviation of 12.8 months. The records of these visits were then examined to document any further dental treatment delivered/needed. Out of the 72 children who were followed-up, it was found that within a 16-month duration following the DGA, (23.5%) of patients needed additional dental care. (Figure 5). Furthermore, the clinical notes were thoroughly checked to identify whether these needed treatments were the result of a new carious lesion or a previously treated tooth that failed. Out of the previously stated patients, (60.9%) were diagnosed with new lesions and (39.1%) were diagnosed with a failure of previously delivered treatment.

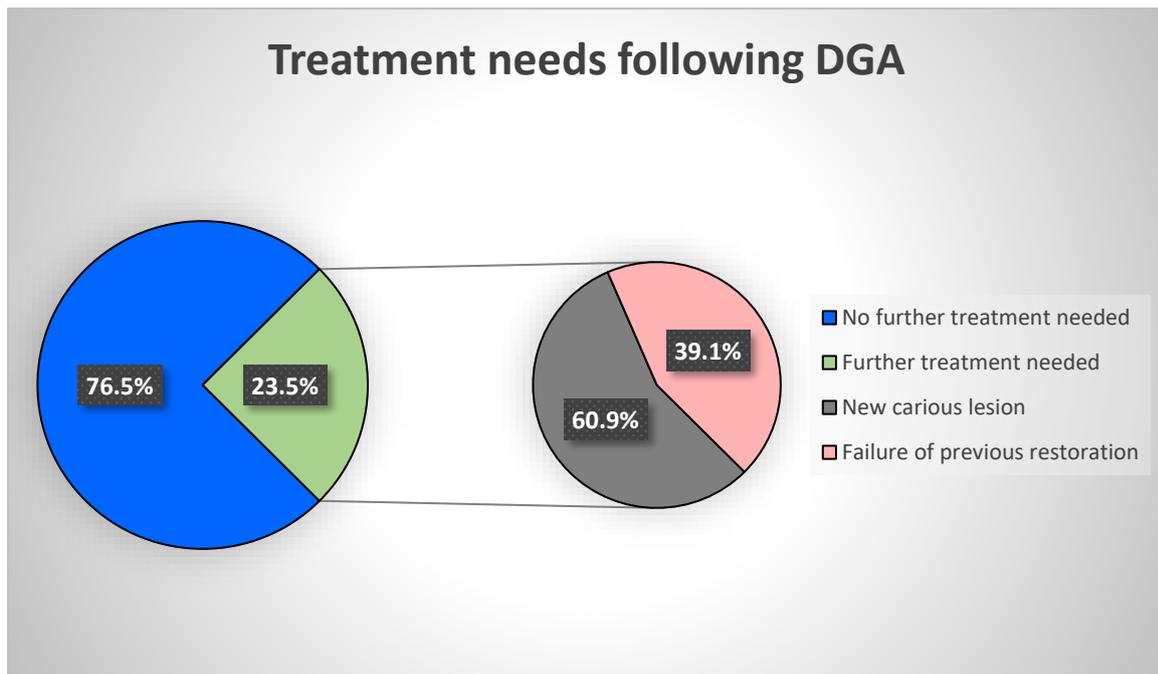


Figure 5 Number of patients requiring further dental treatment following DGA

### 5.9. Correlation between follow-up and further dental needs

The records of the patients who received additional dental treatment following their DGA were thoroughly examined to measure their attendance rate to the scheduled follow-up appointments. It was found that 52.2% missed their one-week visit, while 66.7% missed their three-months appointment and 60.9% did not show to their six-months follow-up. The chi-square statistical test was then used to determine if the follow-up attendance rate was correlated to the need for further treatment and the result was statistically significant correlation at a P-value of 0.008.

### 5.10. Healthy vs. SHCN patients

As shown in Table 5, numerous aspects were studied regarding the differences between SHCN and healthy patients. The sample consisted of 26 (26.5%) SHCN 'ASA II and above' and 72 (73.5%) healthy children. The mean age of the two groups at the time of the GA was found to

be significantly different. Healthy patients had a mean age of 4.48 (SD  $\pm$ 1.7) years. While the SHCN group's mean age was 7.9 (SD  $\pm$ 3.7) years. When these results were analyzed using the Mann-Whitney test a significant P value of 0.0001 was noted.

Treatment delivered to both groups were investigated and compared against each other. Duration of treatment was found to be not significantly different with a P-value of 0.143. Extractions, composites, pulpectomies, and zirconia crowns were also found to be non-significantly different, with P values of 0.170, 0.413, 0.342, and 0.329, respectively. Data analysis showed that SHCN patients received fewer pulpomies than their healthy peers. This was found to be statistically significant with a P-value of 0.008. Additionally, receiving SSCs were statistically significantly different (P=0.0001), as the healthy patients' group received more SSCs. Lastly, the data showed that fissure sealants differed significantly between the two groups. SHCN patients received an average of 3.65 sealants per patient compared to a 1.51 sealant per healthy child. Which after analysis, showed a P-value of 0.000.

Table 5 Healthy vs SHCN

		Age in years	Duration in minutes	Extraction	Composite
<b>Healthy</b>	N	72	72	72	72
	Mean	4.48	91.45	2.57	2.32
	St. Deviation	1.77	26.41	2.37	2.33
<b>SHCN</b>	N	26	26	26	26
	Mean	7.99	87.58	4.27	1.77
	St. Deviation	3.66	21.39	4.39	1.73
<b>Total</b>	N	98	98	98	98
	Mean	5.42	97.14	3.02	2.17
	St. Deviation	2.86	26.61	3.11	2.19
<b>P-value</b>	Asymp. Sig. (2-tailed)	<b>0.0001</b>	0.143	0.170	0.413

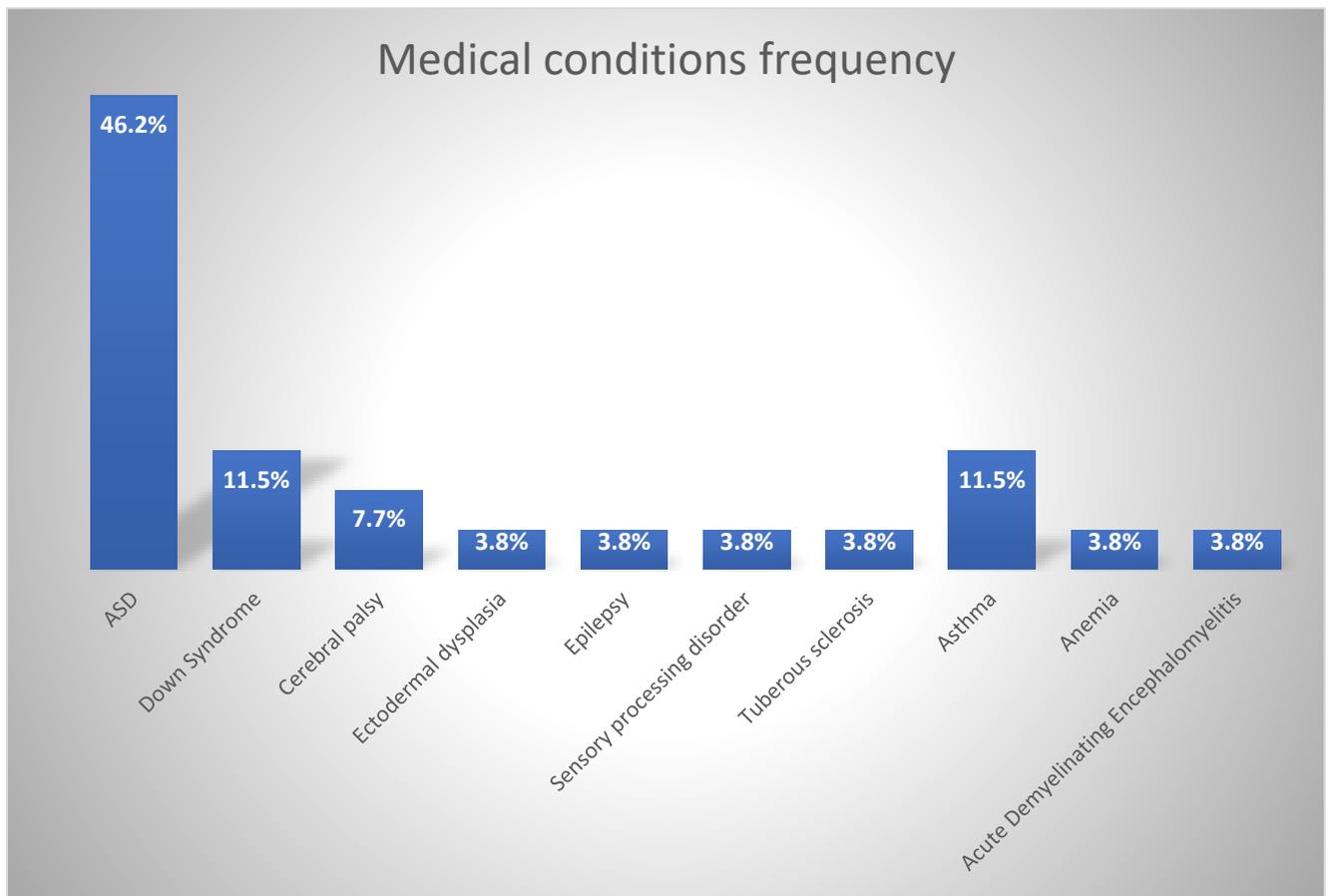
Table 5 continuum.

		Pulpotomy	Pulpectomy	SSC	Zirconia	Sealants
<b>Healthy</b>	N	72	72	72	72	71
	Mean	1.64	0.17	4.36	0.65	0.77
	St. Deviation	1.73	0.63	2.60	1.53	1.51
<b>SHCN</b>	N	26	26	26	26	26
	Mean	0.69	0.04	1.65	0.15	3.65
	St. Deviation	1.01	0.19	1.88	0.46	4.65
<b>Total</b>	N	98	98	98	98	97
	Mean	1.39	0.13	3.64	0.52	1.55
	St. Deviation	1.62	0.55	2.70	1.35	2.99
<b>P-value</b>	Asymp. Sig. (2-tailed)	<b>0.008</b>	0.34	<b>0.0001</b>	0.329	<b>0.000</b>

### 5.11. Types of medical conditions

Medical disorders and special health care needs (physical or intellectual) were identified in 26 (26.5%) of the subjects. The frequency of these conditions is summarized in Figure 6. Autistic spectrum disorder (ASD) was the most frequently noted condition with a percentage of 46.2%. Asthma and Down's syndrome were equally identified as the next most common conditions at 11.5%, followed by cerebral palsy (7.7%). Remaining disorders shared the same percentage of 3.8%.

Figure 6 Types of medical conditions



### 5.12. Post-operative complications and morbidities

Clinical notes of the follow-up appointments were scanned to identify the post-operative complications reported by the parents/guardians in the first week following the procedure. Out of the 98 patients, 72 clinical notes contained the needed information while the remaining 26 were insufficient to detect postoperative complications. Out of the 72, dental morbidities were reported by 16 patients. Pain was the most reported symptom by nine children that required analgesics. Two patients reported gum bleeding the day after the procedure. four patients noted swelling in the gums. While one child was complaining of a painful ulcer. Medical complications occurred in three patients. one patient reported a sore throat and spiked a mild fever following the procedure that was controlled by antipyretics at home. In contrast, another patient developed a fever that required admission to the hospital. Lastly, one patient went into

laryngospasm during the termination of the general anesthetic agent that was reversed and controlled without any further adverse events. Figure 7

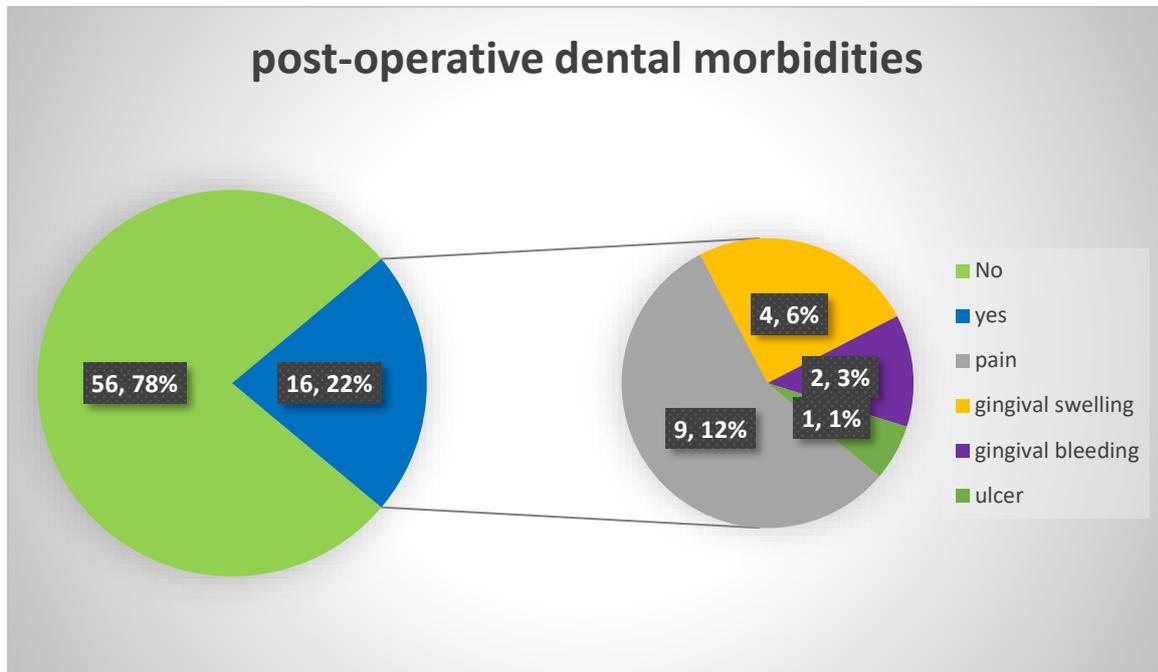


Figure 7 post-operative dental morbidities

### 5.13. DGA Repeat rate

Five out of 98 patients (5%) had a history of a previous DGA. Three patients were diagnosed with conditions that prevented them from receiving conventional treatment under LA (Down's syndrome, ASD, and sensory processing disorder), while the other two patients were diagnosed with conditions that required multiple dental interventions which needed to be carried at specific developmental stages (cleidocranial dysplasia and amelogenesis imperfecta).

## 6. DISCUSSION

The present study was designed to investigate the characteristics of comprehensive dental treatment provided under general anesthesia in a postgraduate dental hospital in Dubai, UAE. The most common reason for treating these pediatric patients was dental caries, especially ECC. Despite the disease being preventable, ECC remains one of the most common chronic conditions affecting children globally (32). While most children can tolerate conventional dental treatments in the dental clinic, many others tend to get their treatments accomplished under GA (1). Several studies were conducted worldwide investigating different elements of pediatric DGA (5)(6)(7). However, to the best of our knowledge no such study has been carried out in the UAE to date.

The current study found that most children who underwent DGA were males (62.2%), which is consistent with findings of some previous studies (114) (115) while it contradicts the findings of others (116) (117). The sample's mean age was 5.4 years (SD  $\pm$ 2.8). This value agrees with the findings of other studies, in which similar results were found (4)(114). However, the age of SHCN patients was significantly higher (7.99 years) than that of healthy patients at the time of the GA (P=0.000). This may suggest that GA remains the preferred treatment option for patients with SHCN who cannot cope with the conventional dental setting even at an older age.

The analysis showed that the trend of DGA has been in an upward direction, where the number of procedures had slightly increased each year. This result agreed with Deery's (2015) findings which showed a similar trend (77). This increase in the number of DGA cases could be attributed to the general increase in the volume of patients over the years. One other possible explanation is that parent's awareness of the GA procedure is increasing and are more willing to accept it as a treatment option for their children. Moreover, in this study SECC was found

to be the most common cause for DGA (85%). These results seem to be consistent with other studies, which found that most of their DGAs were also the result of ECC (90) (115)(51). These findings are rather disappointing and suggest that ECC remains a burden that needs to be resolved. While the intake of simple sugars drives the carious process, the topical and systemic application of fluoride can attenuate the process. Water fluoridation is the only oral health improvement intervention that does not require behaviour change by individuals.

Most treatments carried out under GA were a combination of extractions, restorative, and preventive interventions. Pre-formed SSCs were the predominant modality of restorative treatment over composite restorations and zirconia crowns. This result could be explained by the fact that SSC's have been strongly supported by data to be the most durable and with the highest success rates amongst all restorative materials (118). In their study, Jamjoom et al. (2008) showed that extractions were very few for patients going through FMOR under GA (115). This differs from the findings of this study, as extractions were higher in number than all types of pulp therapies combined (pulpotomies, pulpectomies, and IPC). This may be the result of more severe unrestorable carious teeth. Another possible explanation for this might be the available evidence of research showing that an aggressive treatment plan should be adopted for pediatric DGA to ensure a successful outcome and prevent the need for a repeat in the future (6) (25). Correspondingly, further research is required to establish the success rate of each treatment individually. However, one downside to premature extraction of primary teeth at a younger age is the definitive loss of space. Bhujel et al, concluded in their study that premature extraction of primary teeth at a young age significantly increased the need for orthodontic treatment in the future (119). Similarly, a systematic review by Kaklamanos et.al showed that 1.5mm of space could be lost after premature extraction of first primary molars (120). This highlights the importance of prevention and the need to preserve these teeth as much as possible.

A significant percentage of patients failed to show at their scheduled recall visits following their DGA. This finding matched those observed in earlier studies showing minimal adherence of patients to their scheduled follow-up appointments (89) (121) (115). A few treated patients were referred for COR under GA by their general practitioner who does not provide the service of GA. It is possible that these patients continued their follow-up sessions with the referring dentist afterwards. Owing to this fact, this study was unable to measure the success/failure rate of treatments delivered during DGAs. Patients who attended regularly received preventive interventions, oral hygiene instructions and dietary advice. Hence, very few required further restorative treatment. However, 23 patients received additional dental treatment following their DGA. A combination of Glass Ionomer Cement (GIC) and SSCs using the Hall technique was utilized for delivery of these treatments. A study by Al Halabi et.al; showed that this approach could be used as an acceptable alternative to GA for children who are pre-cooperative or un-cooperative (122).

An interesting correlation was found between attendance rate to recall visits and the need for further treatment. It was found that those who needed additional dental treatment missed most of their routine check-up appointments. One possible explanation for this finding is that patients who missed their follow-up appointments did not receive the routinely needed preventive interventions. These results agree with the findings of other studies in which regular follow-up was mentioned as one of the significant factors in success rates of DGA (6)(75). This finding may suggest that establishing a rigorous pre-operative prevention plan may help prevent the need for further dental treatment. However, a note of caution is due here since this study was not designed to assess the factors affecting the need for further dental treatments following DGA. Further research should be undertaken to investigate this topic.

In this study, 26.5% of patients were categorized as SHCN 'ASA II' which seemed to match the findings observed in other studies (123)(124). The most common conditions of patients

treated under GA were ASD, Down's syndrome, and cerebral palsy. This was similar to the results reported by Shahed et al. where ASD and cerebral palsy were also found to be the most common conditions necessitating pediatric DGA (125). Regarding DGA indications and justification, the analysis in the current study showed that pre-cooperative young age was the most common reason that justified the use of GA. Likewise, previous studies have also demonstrated that most children who go through FMOR under GA are less than five years old (90)(11).

Most of the dental procedures provided during the DGA were extractions and SSCs for both primary and permanent teeth. However, further analysis of treatment modalities between SHCN and healthy children indicated significant differences. The SHCN group seemed to have far fewer pulp therapies than healthy children. This could indicate that the severity of the decay was less in healthy children allowing performing more pulpal procedures compared to SHCN children where the caries activity was more advanced rendering the success of pulp therapy questionable. Consequently, the operators favoured the option of extraction. This phenomenon is not uncommon, where previous studies showed that the child health's status seemed to affect the decision of treatment (126) (127). Operators tend to provide more radical dental treatments for SHCN patients under GA to ensure a higher success rate and prevent future complications (124). Even though the results of this study did not show a significant difference, extractions in the SHCN patients were higher in number than in the healthy group. Moreover, SHCN patients also received significantly fewer SSCs than their healthy peers. This can further support the hypothesis that when caries activity is of an advanced stage, extraction is the favoured approach in SHCN children. However, with small sample size, caution must be applied, as the findings might not apply to the general population. More specifically designed studies with emphasis on decayed, missing, and filled surfaces (dmfs) investigation are required to gain more insight on this topic. On the other hand, the SHCN group received

significantly more fissure sealants for both primary and permanent teeth than the healthy patients. This observed increase in the preventive measures amongst SHCN patients could be attributed to the fact that this group of children are at a higher risk of caries development (62). Furthermore, infections arising from a dental disease may interfere with the control of their medical condition (128). One more possible explanation is that dental treatment for children with SHCN may require facilities with special equipment to allow the treatment to be delivered safely (129). Therefore, reducing the morbidity of oral conditions and preventing the development of dental decay following DGA was a major concern prior to commencing the treatment. Additionally, SHCN children DGA was performed at an older age with a higher number of permanent molars that needed sealants. On numerous occasions, the SHCN children are treated under GA to perform proper professional scaling and prophylaxis when they present with heavy calculus deposits. The usual practice for these children is to seal any non-carious teeth under GA.

The most frequently reported post-operative complaint by patients was pain. Of which 12.5% required analgesics the day after the procedure. Comparison of this finding with those of other studies confirms that pain is the most common postoperative comorbidity following DGA (130) (131). However, it is possible that these results are not representative of the actual post-operative complications and their frequency as a high percentage of patients did not attend any follow-up appointments, and therefore a major proportion of data was not recorded.

Even though this study did not focus on identifying reasons for the repeat rate of DGA, it still provided some insightful data on this subject. Two patients (2%) had multiple planned episodes of DGA due to the nature of their condition which required several dental interventions at specific developmental stages. One patient (1%) presented with a history of a previous DGA. While two patients (2%) had an unplanned repeat for their DGA. Records of the first patient could not be obtained, but the latter two patients showed that they both missed their one-week,

3- and 6-month follow-up appointments and only returned when dental pain was a symptom. One of the issues that emerge from this finding is that some parents are not aware of the significance of children's oral health and its implication on their wellbeing and overall quality of life. This issue was investigated in the UAE by Alantali et al., The results of their study indicated that children had a lower quality of life before getting dental treatment compared to after FMOR under GA (132). A significant improvement was noticed in children's function, psychology, and social interactions. This observation has the important implication for developing a public education program and raise awareness on this matter.

### **Limitations of the study:**

Several important limitations need to be considered.

- The principal limitation of this study was the nature of its retrospective design. Thus, key factors such as success/failure rates could not be assessed.
- The second limitation of this study was the unrecorded proportion of the data due to the lack of follow-up, which may have affected the gathered information from the sample.
- In addition, this study was conducted in the only postgraduate dental hospital in Dubai. While this represents an important academic aspect of pediatric dentistry, it is not fully representative of Dubai. This is because DGA is carried out in numerous private pediatric dental facilities spread across the city, and governmental health centres that provide DGA procedures to children.

Therefore, further studies using a different experimental setup should be conducted to better understand this topic.

In summary, this study has extended our knowledge of the pattern of dental treatment performed for the pediatric population under GA as well as the important factors that might

affect the success rate of pediatric DGA. These observed findings are particularly relevant and could be used to help future planning of FMOR under GA for children.

## 7. CONCLUSIONS AND RECOMMENDATIONS

### **Conclusions**

In the sample of pediatric dental patients treated under general anesthesia in a postgraduate dental hospital in Dubai, and within the limitation of this study, it can be concluded that:

- Pre-formed SSCs were the predominant modality of restorative treatment over composite restorations and zirconia crowns.
- ECC and pre-cooperative stage were the main reasons leading to DGA.
- Different treatment approaches were observed between SHCN and healthy children.
- Comprehensive treatment plans, which consisted mainly of dental extractions and fewer pulp therapies, were found to have been conducted in those SHCN children, accompanied by a notable increase in preventive interventions when compared to healthy patients.
- A major finding was that many children were not brought-in following DGA and had frequently missed recall appointments. This increased the likelihood of developing new carious lesions and consequently increased the need for further dental treatment.

### **Recommendations**

- The results of this study highlighted the importance of oral health education for parents/guardians of children especially SHCN children. Moreover, parents' education is vital to establish regular supervision of oral hygiene habits as many children with special health care needs might face difficulties maintaining optimum oral care. It is also essential to educate parents/caregivers on the importance of regular attendance to follow-up appointments following the DGA. These results will be shared with the

Dubai Dental Hospital management, to discuss the effective clinical pathway to establishing a robust recall system following DGAs. Moreover, a pre-operative prevention protocol consisting of multiple sessions to evaluate oral hygiene improvement could be adopted for children scheduled for FMOR under GA.

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## 9. APPENDIX

### APPENDIX I: Patient Registration File (AR)



#### تقييم السجل الطبي للأطفال

رقم الملف الطبي: .....

الاسم الكامل للمريض :			
الجنس:	<input type="checkbox"/> ذكر	<input type="checkbox"/> أنثى	
الجنسية:	تاريخ الميلاد	/ /	العمر:
رقم الهاتف المتحرك للأبوين/ ولي الأمر:	رقم هاتف المنزل للأبوين/ ولي الأمر:		
عنوان البريد الإلكتروني:			
اسم يمكن الاتصال به في الحالات الطارئة:	رقم الهاتف/ الحالات الطارئة:		
اسم الطبيب	رقم الهاتف		
كيف توصلت هنا	<input type="checkbox"/> العائلة	<input type="checkbox"/> الأصدقاء	<input type="checkbox"/> التلفاز
	<input type="checkbox"/> الإذاعة	<input type="checkbox"/> الجريدة	<input type="checkbox"/> الانترنت
	<input type="checkbox"/> المجلات		

الرجاء اختيار نعم / أو لا على الأسئلة التالية:

1. هل تم تحويلك من قبل طبيب/ طبيب أسنان؟  
إذا كانت إجابتك نعم، اسم الطبيب:  نعم  لا

2. هل هذه زيارة طفلك الأولى لطبيب الأسنان؟  نعم  لا

3. هل يعاني طفلك اليوم من مشكلة في الأسنان؟  
إذا كانت الإجابة نعم، الرجاء التوضيح:  نعم  لا

4. هل يعاني طفلك من أي مشاكل صحية أو جسدية؟  
إذا كانت الإجابة نعم، الرجاء التوضيح:  نعم  لا

5. هل يعالج الطبيب طفلك الآن لمرض محدد؟  
إذا كانت الإجابة نعم، الرجاء التوضيح:  نعم  لا

6. هل يتناول طفلك أي ادوية في الوقت الحالي؟  
إذا كانت الإجابة نعم، اسم الدواء:  نعم  لا

7. هل يعاني طفلك من أي حساسية تجاه الادوية أو الطعام أو أي مواد أخرى؟  
8. هل أخذ طفلك دواء البنسلين من قبل  نعم  لا

9. هل نزع طفلك بشكل مفرط نتيجة جرح أو خلع الأسنان؟  نعم  لا

10. هل تم إدخال طفلك المستشفى من قبل؟  
إذا كانت الإجابة نعم، متى؟  نعم  لا

11. هل يعاني طفلك أي من الاضطرابات / الأمراض التالية:

<input type="checkbox"/> لا	<input type="checkbox"/> نعم	أمراض القلب	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	الإيدز
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	التهاب الكبد	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	الربو
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	مشاكل الكلى	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	التوحد
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	امراض الكبد	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	مشاكل نزف الدم
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	التأخر العقلي	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	نقل الدم
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	اعاقة حركية	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	الكدمات
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	اضطرابات نفسية	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	اصابات الدماغ
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	حمى الروماتيزم	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	سرطان
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	الصرع/ تشنجات	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	الشلل الدماغي
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	مرض الخلية المنجلية	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	مرض السكري
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	صعوبات النطق	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	مشاكل العين
<input type="checkbox"/> لا	<input type="checkbox"/> نعم	السل	<input type="checkbox"/> لا	<input type="checkbox"/> نعم	فقدان السمع

صلة القرابة بالطفل:

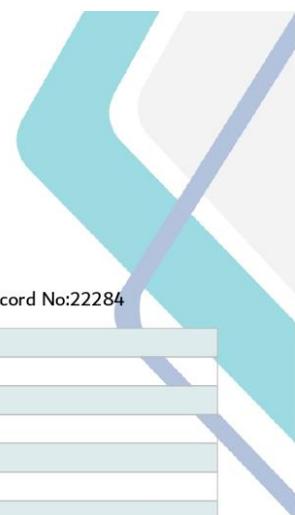
التوقيع: .....

توقيع الطبيب/ الأخصائي: .....

التاريخ: .....

التاريخ: .....

## APPENDIX II: Patient Registration Form (EN)



### PEDIATRIC MEDICAL HISTORY EVALUATION

Medical Record No:22284

Patient Full Name: Fatima Al Jasmi			
Gender:	<input checked="" type="checkbox"/> Male	<input type="checkbox"/> Female	
Age:	Date Of Birth: 02/07/2013	Nationality:	
Parent/Guardian Home Number:		Parent/Guardian Home Number:	
Email Address:			
Emergency Contact Name:		Emergency Contact Number:	
Physician's Name:		Telephone:	
How did you hear about us:	<input checked="" type="checkbox"/> Family	<input checked="" type="checkbox"/> Friends	<input checked="" type="checkbox"/> TV
	<input type="checkbox"/> Radio	<input type="checkbox"/> Internet	<input type="checkbox"/> Magazine
	<input type="checkbox"/> Newspaper		

**Please Choose YES or NO for the following questions:**

- Were you referred by a doctor/dentist?  YES  NO  
If yes, doctor's name: -----
- Is this your child's first visit to a dentist?  YES  NO
- Does your child have a dental problem today?  YES  NO  
If yes, describe -----
- Does your child have any medical or physical problems?  YES  NO  
If yes, describe -----
- Is a physician treating your child now for a specific illness?  YES  NO  
If yes, describe -----
- Is your child taking any medication at this time?  YES  NO  
If YES, Name of medication? ----- Reason? -----
- Does your child have any allergies to medicines, food or other substances?  YES  NO
- Has your child even taken penicillin?  YES  NO  
If yes, describe -----
- Has your child ever bled excessively from a cut or teeth extraction?  YES  NO
- Has your child ever been in a hospital?  YES  NO  
If YES, When? ----- Reason? -----
- Does your child have any of the following conditions?
 

AIDS	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Heart Disease	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Asthma	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Hepatitis	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Autism	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Kidney Problem	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Bleeding Problems	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Liver Disease	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Blood Transfusion	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Mental Retardation	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Bruising Problem	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Physical Disability	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Brain Injury	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Psychiatric Disorders	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Cancer	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Rheumatic Fever	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Cerebral Palsy	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Seizures/Epilepsy	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Diabetes	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Sickle Cell Disease	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Eye Problems	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Speech Difficulties	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Hearing Loss	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Tuberculosis	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

How are you related to this child? -----

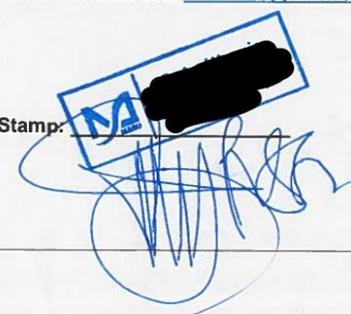
Signature: ----- Date: -----

Dentist/Specialist Signature: ----- Date: -----

**APPENDIX III: Surgical Booking Form**



**SURGICAL BOOKING FORM**

Date and Time of Request: 9AM @ 30/4/19 Physician Name: DR. [REDACTED]  
 Name of the Clinic (*Outside facility only*):  
DUBAI DENTAL HOSPITAL F2 LLC  
 Patient's Name: [REDACTED] Age: [REDACTED] Gender: [REDACTED]  
 Height \_\_\_\_\_ cm Weight \_\_\_\_\_ Kg  
 Country of residence: [REDACTED] Contact Number: [REDACTED]  
 Preoperative Diagnosis: SPECIAL NEEDS, DENTAL CARIES, GINGIVITIS  
 Mode of Payment: Self-pay:  Insurance:  Others   
 Name of the Insurance Provider: \_\_\_\_\_ Approval taken: Yes  No   
 Primary Operation Details: FULL MOUTH EXAMINATION AND COMPLETE ORAL REHABILITATION UNDER GENERAL ANAESTHESIA  
 Date of surgery: 30/4/19 Preferred Time of Surgery: 9AM  
 Estimated time required: 2 hours  
 Anesthesiologist Required: Yes  No   
 Anesthesia appointment requested: Yes  No   
 Pre-Anaesthesia Questionnaire Done: Yes  No   
 Preferred Type of Anesthesia: GA:  MAC:  Local Anesthesia:  Regional:   
 Special Requirements/ Equipments if any \_\_\_\_\_  
 Prosthesis Required: \_\_\_\_\_  
**NOTE:** Operating Room bookings need to done through phone at +97144458585, followed by booking forms to be faxed on +971 4 446 9867 or email us at [headnurse@brms.ae](mailto:headnurse@brms.ae)  
 Doctor's Signature and Stamp: [REDACTED] Date & Time : 30/4/19 @ 9AM  


FM-MED-002

## APPENDIX IV: Discharge Summary

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### Discharge Summary

---

Name:	[REDACTED]	MR No:	[REDACTED]
Age/Sex:	[REDACTED]	Visit ID:	[REDACTED]
Weight:	[REDACTED]	Admission Date:	[REDACTED]
Doctor:	[REDACTED]	Discharge Date:	[REDACTED]
Department:	[REDACTED]		



---

#### 1. Final Diagnosis

Diag. Type	Diag. Code	Description	Remarks
Principal	[REDACTED]	[REDACTED]	

#### 2. Operations/Procedures

##### Operation Name

Full Mouth Dental Rehabilitation

#### 3. Chief Complaint / Reason for Admission

Complaint: Severe early Childhood caries of the Primary dentition

Other Complaints: NA

#### 4. Significant Findings

**Significant History:** Severe early Childhood caries of the Primary dentition,

**Physical Examination:** Intraoral

**Past Family & Social History:** Past Medical / Surgical History: : None,

**Significant Investigation Results:** Severe early Childhood caries of the Primary dentition

**Pending Results(if any):** None

**Investigation History:** Lab,Bitewings-1,periapical -5 X-Ray

#### 5. Hospital Course

**Summary of Treatment:** Patient came with Severe early Childhood caries of the Primary dentition. Full Mouth Dental Rehabilitation done under GA.

**Procedure/ Operation:** Full Mouth Dental Rehabilitation done under GA.

**Response to treatment:** Good

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**Discharge Summary**

---

Name: [REDACTED]  
Age/Sex: [REDACTED]  
Weight: [REDACTED]  
Doctor: [REDACTED]  
Department: [REDACTED]

MR No: [REDACTED]  
Visit ID: [REDACTED]  
Admission Date: [REDACTED]  
Discharge Date: [REDACTED]



---

Complication/ Adverse reaction (if any):None

**6. Condition on Discharge:**Ambulatory and Vital signs stable

**7. Means of Transport:**Car:

**8. Accompanied by:**Relative

Services:

**Doctor prescriptions:**

Prescribing Doctor	Type	Name	Dosage	Frequency	Route	Start	End	Remarks
[REDACTED]	Medicine	PRILOCAINE 2.5% LIDOCAINE 2.5% CREAM/CREAM	1	Once	TOPICAL	20-03-2019 07:30	1 time(s)	For IV access sites
[REDACTED]	Medicine	MIDAZOLAM 5 MG/ML SOLUTION FOR INJECTION/SOLUTION FOR INJECTION	1	Once		20-03-2019 07:45	1 time(s)	Orally as pre-medication, mixed with other drugs
[REDACTED]	Medicine	KETAMINE 10 MG/ML SOLUTION FOR INJECTION/INJECTION	1	Once		20-03-2019 07:45	1 time(s)	Orally as pre-medication, mixed with other drugs
[REDACTED]	Medicine	ATROPINE 0.5 MG/5ML SOLUTION FOR INJECTION/SOLUTION FOR INJECTION	1	Once		20-03-2019 07:45	1 time(s)	Orally as pre-medication, mixed with other drugs
[REDACTED]	Medicine	PARACETAMOL 120 MG/5ML SYRUP/SYRUP	1	Once	ORAL	20-03-2019 07:45	1 time(s)	Orally as pre-medication, mixed with other drugs

---

**Discharge Summary**

---

Name: [REDACTED] MR No: [REDACTED]  
 Age/Sex: [REDACTED] Visit ID: [REDACTED]  
 Weight: [REDACTED] Admission Date: [REDACTED]  
 Doctor: [REDACTED] Discharge Date: [REDACTED]  
 Department: Dental




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**9.DISCHARGE PLAN**

**a. Discharge Medication:**

Medicine Name	Form	Strength	Admin Strength	Details	Route	Instructions	Special Instructions	Qty	Discontinued
IBUPROFEN 100 MG/5ML SYRUP	SYRUP	100 MG/5ML	5ml	TID/5 D Fr:20-03-2019 To:24-03-2019	ORAL	3 times per day for 5 days		1	No

**Patient/Family Education**

Subject	Details	Education Goals Accomplished
FINAL DIAGNOSIS	Principal K02.9 Dental caries, unspecified	
TREATMENTS AT HOME	None	
Medical Equipment	None	
Medication / Diet Interaction	Soft and Cold diet for 2 days	
Home self care	Given	
NUTRITION / DISCHARGE	Given	
DAILY ACTIVITIES	Normal	
Restrictions	None	
PROGNOSIS	Good	

---

**Discharge Summary**

---

Name: [REDACTED]  
Age/Sex: [REDACTED]  
Weight: [REDACTED]  
Doctor: [REDACTED]  
Department: [REDACTED]

MR No: [REDACTED]  
Visit ID: [REDACTED]  
Admission Date: [REDACTED]  
Discharge Date: [REDACTED]



---

Appointment Date [REDACTED]  
Appointment Doctor Dr [REDACTED]  
Instructions given by DR [REDACTED]

Signature:

Date: [REDACTED]

Doctor's Seal

**In case of emergency please contact:** [REDACTED]

PATIENT DECLARATION  
I have reviewed and understand the above instructions.  
Patient/ Next of Kin Name: [REDACTED]

Signature:

Date: [REDACTED] Time: [REDACTED]

**Follow Up Details**

[REDACTED] [REDACTED] Followup after 1 week

## APPENDIX V: Operation Summary

	MR No : ██████████
	Name : ██████████
	IP No : ██████████

**OPERATION SUMMARY**

Date: ██████████

Surgeon Name: Dr. ██████████

Assistant Surgeon: Dr. ██████████

Scrub Nurse: ██████████

Floor Nurse : ██████████

Anesthesiologist: ██████████

Anesthesia:  GA  Spinal  Local - Specify

Type of Procedure:  Elective  Emergency

Pre-Operative Diagnosis: Dental Caries, Periapical abscess

Post-Operative Diagnosis: Dental Caries, Periapical abscess

Operation: Full Mouth Dental Rehabilitation

Incision Type: None

Operation findings:  
None

IN TIME: 12:01  
OUT TIME: 13:57  
DURATION: 1 Hour and 56 Minutes

Description of Procedures:  
Composite Restoration on Teeth 53,63,73,83  
Pulpectomy+SSC On Tooth 85  
Pulpotomy +SSC On Tooth 75  
Extraction of Teeth 74,84  
SSC On Teeth 64,54  
F/S On Teeth 55,65  
Fluoride varnish  
SM Impression

Closure Technique  
None

Pressure & Tubes:  
None

Any Problems, Complications & Management:  
None

Estimated Blood Loss:  
Minimal

Details of Specimen Removed:  
None

Doctor's Sign      Dr. [REDACTED]

Date: [REDACTED]      Time: [REDACTED]

## APPENDIX VI: MBRU IRB Ethical Approval



25 August 2020

**Mohammad Abdo**  
**Resident – Pediatric Dentistry**  
**HBMCDM**

RE: MBRU-IRB-2020-007

Dear Dr Mohammad,

Thank you for submitting to the IRB clarifications on the study titled “Characteristics of pediatric dental treatment provided under general anesthesia in Dubai, United Arab Emirates – A retrospective analysis”. The Board has reviewed the same at its meeting of 25 August 2020 and has agreed to approve it.

The project can now commence. Any change in protocol should be notified to the Board.

For any questions, please contact the Institutional Review Board [irb@mbru.ac.ae](mailto:irb@mbru.ac.ae).

Thank you for your interest in MBRU-IRB.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Essa Kazim'.

**Dr Essa Kazim**  
**Chairman, MBRU-IRB**

