GUIDELINES FOR

PEDIATRIC DENTISTRY

Version 1

Issue Date: 10/06/2021

Effective Date: 10/08/2021

Health Policies and Standards Department

Health Regulation Sector (2021)

INTRODUCTION

Dubai Health Authority (DHA) is the responsible entity for regulating, licensing and monitoring health facilities and healthcare professionals in the Emirate of Dubai. The Health Regulation Sector (HRS) is an integral part of DHA and was founded to fulfil the following overarching strategic objectives and program:

Objective #1: Position Dubai as a global medical destination by introducing a value-based, comprehensive, integrated and high quality service delivery system.

Objective #2: Direct resources to ensure healthy and safe environment for Dubai population.

Strategic Program #5: Oral & Dental Care- This program focuses on improving the oral health outcomes and ensure that all individuals have access to high quality treatments and effective prevention programs for dental care.

ACKNOWLEDGMENT

This document was developed by Dental Services Department, Primary Healthcare Services Sector (PHCSS). It has further been reviewed by the Health Policy and Standards Department (HPSD).

HRS would like to acknowledge and thank all parties that participated and worked toward developing these guidelines to ensure improving the quality and safety of healthcare services.

The Health Regulation Sector

Dubai Health Authority

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EXECUTIVE SUMMARY

Clinical guidelines to enhance the standard of care in health facilities are increasingly becoming part of current practice and will become more common over the next decade. These Clinical Guidelines aim to improve the quality and the level of healthcare provided to the clients. Healthcare providers can use these guidelines to answer specific questions in day-to-day practice and as an information source for continuing professional education.

This document presents a framework for Pediatric dentists to:

- To present a framework to equip the Pediatric Dentist with the necessary information and recommendations for the application of fluoride varnish in pediatric patients.
- To assist dental healthcare providers when using Silver Diamine Fluoride (SDF) in the Management of Dental Caries Lesions.
- To provide an overview on the topic of “Hall technique” to assist Pediatric Dentist make informed choices in dental management.
- To assist dental healthcare providers using Local Anaesthesia (LA) to control pains in infants, children, adolescents and people with determination during the delivery of oral health care services.
- To ensure pediatric patients are provided with effective and successful conscious sedation with N2O if required, in clinical practice.
- To provide quality dental care that is standardized, successful and efficient when referring to and performing complete oral rehabilitation under General Anaesthesia (GA) in children.

- To increase knowledge of oral disease prevention from infancy through adolescence to help reduce the incidence of early childhood caries.

DEFINITIONS

Clinical Privileging: is the process of giving a DHA licensed Healthcare Professional (HP) permission to carry out specific duties as per health facility scope of practice and licensure. This involves the review of credentials and qualifications, training, competence, practical independence and experience.

Dental Caries: is the cavity formation in teeth caused by bacteria that attach to teeth and form acids in the presence of sucrose, other sugars, and refined starches; tooth decay.

Dental Decay in Infants and Young Children is also called “nursing caries”, “nursing bottle caries”, “nursing bottle syndrome”, baby bottle caries” and “baby bottle tooth decay”.

Dental Local anesthesia: is the temporary loss of sensation including pain in one part of the body produced by a topically applied or injected agent without depressing the level of consciousness.

Early Childhood Caries (**ECC)** is 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 71 months of age or younger.

Fluoride Varnish: is a highly concentrated form of Fluoride, which is applied to the tooth's surface.

Medical Director: is a DHA licensed physician who holds responsibility and oversight of medical services and clinical operations within a DHA licensed health facility.

Severe Early Childhood Caries (S-ECC) is the caries in children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries. From ages three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled surfaces with a score of =4 (age three), =5 (age four), or =6 (age five) is indicative of S-ECC.

ABBREVIATIONS

AAPD	:	American Academy of Pediatric Dentistry
ADA	:	American Dental Association
ASA	:	American Society of Anesthesiologists
BMI	:	Body Mass Index
CaF2	:	Calcium Fluoride
CNS	:	Central Nervous System
CPC	:	Clinical Privileging Committee
COPD	:	Chronic Obstructive Pulmonary Disease
DHA	:	Dubai Health Authority
DHIC	:	Dubai Health Insurance Corporation
ECC	:	Early Childhood Caries
GA	:	General Anaesthesia
HPSD	:	Health Policies and Standards Department
HRS	:	Health Regulation Sector
LA	:	Local Anaesthesia
MS	:	Mutans Streptococci
N2O	:	Nitrous Oxide
O2	:	Oxygen
PADS	:	Post-Anesthesia Discharge Scoring System
PALS	:	Pediatric Advanced Life Support
PEARS	:	Pediatric Emergency Assessment, Recognition and Stabilization

PHCSS	:	Primary Healthcare Services Sector
PPM	:	Parts per million
SaO2	:	Oxygen saturation
SDF	:	Silver Diamine Fluoride
S-ECC	:	Severe Early Childhood Caries
UAE	:	United Arab Emirates

A. GUIDELINES FOR APPLICATION OF FLUORIDE VARNISH

1. BACKGROUND

Fluoride varnish is one of the best options for increasing the availability of topical fluoride, regardless of the levels of fluoride in the water supply. Fluoride varnish is the most effective additional fluoride agent for reducing caries in both the primary and permanent dentition. High quality evidence of the caries-preventive effectiveness of fluoride varnish in both permanent and primary dentitions has been reported in the literature. A number of systematic reviews conclude that applications two or more times a year produce a mean reduction in caries increment of 37% in the primary dentition and 43% in the permanent. The evidence supports the view that varnish application can also arrest existing lesions on the smooth surfaces of primary teeth and roots of permanent teeth. Much of the evidence of effectiveness is derived from studies, which have used sodium fluoride 22,600ppm varnish for application.

2. SCOPE

2.1. Provide recommendations to assist Pediatric dentist in the application of Fluoride Varnish to the teeth of Pediatric patients.

3. PURPOSE

3.1. To equip health care provider with the necessary information and recommendations for the application of fluoride varnish in pediatric patients.

3.2. To prevent and control dental caries in growing children.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists

4.2. DHA licensed General Dentists.

5. **RECOMMENDATION ONE**: INDICATIONS

5.1. Indications according to age:

5.1.1. 0-2 years: Only for high caries risk patients, those who are likely to develop caries and Special need patients, enhanced prevention is required.

5.1.2. Two (2) years and above: For low caries risk, patient standard prevention is required.

5.1.3. For High caries risk, patient enhanced prevention is required.

5.2. For all children aged two (2) years and over, apply fluoride varnish at least twice per year.

5.3. Standard prevention for all children:

5.3.1. Apply sodium fluoride varnish (5%) twice a year.

5.3.2. Although a child might additionally receive fluoride varnish twice a year from the preventive campaigns in the nursery or school, it is acceptable for children to have varnish fluoride applied up to four times per year.

5.3.3. If residual varnish is visible or the child had varnish applied in the past twenty–four (24) hours from preventive campaign in school, defer application until next visit.

5.4. Enhanced prevention for children at increased risk of caries:

5.4.1. Apply sodium fluoride varnish four (4) times per year.

5.4.2. The number of fluoride varnish applied in preventive campaigns should be included in the total number of varnish application per year.

5.4.3. If recommending use of alcohol free sodium fluoride mouthwash for children from seven (7) years of age in addition to fluoride varnish application, advice that this should be used at a different time from tooth brushing.

6. **RECOMMENDATION TWO**: ADVANTAGES

6.1. It is well accepted and considered to be safe.

6.2. The application of fluoride varnish is simple and requires minimal training.

6.3. While a thorough prophylaxis is not essential prior to application, removal of gross plaque is advised.

7. **RECOMMENDATION THREE:** APPLICATION TECHNIQUE

7.1. Fluoride varnishes contain high concentration of fluoride and therefore it is important to not exceed the manufacturer's recommendations. Fluoride varnish which contains 22600 ppm fluoride, 0.25 ml is used for children 2-5 years old and 0.4 ml for children above five (5) years old.

7.2. As proximal surfaces of primary teeth are particularly prone to caries, it is particularly important to include these areas when applying varnish to tooth surfaces.

7.3. Teeth should be dried with cotton wool rolls or a triple syringe to optimize adhesion of the varnish to the tooth.

7.4. The varnish should be carefully applied with a micro brush to pits, fissures and proximal surfaces of primary and permanent teeth and to any carious lesions.

7.5. The patient should be advised to avoid eating, drinking or rinsing for thirty (30) minutes after application and wait at least four hours before brushing their teeth or chewing hard food.

8. **RECOMMENDATION FOUR:** SPECIAL CONSIDERATIONS

8.1. The use of fluoride varnishes is contraindicated in patients with ulcerative gingivitis and stomatitis.

8.2. There is a very small risk of allergy to colophony-containing fluoride varnishes. A child who has been hospitalized due to severe asthma or allergy in the last twelve (12) months or who is allergic to sticking plaster may be at increased risk of an allergic reaction to colophony, so fluoride varnish application is contraindicated. In these cases, consider using a colophony-free varnish or suggest the use of alternative age appropriate fluoride preparations (e.g. fluoride mouthwash or higher concentration fluoride toothpaste).

B. GUIDELINES FOR APPLICATION OF SILVER DIAMINE FLUORIDE

1. BACKGROUND

Dental caries affects about one out of four children aged 2-5 years. Silver Diamine Fluoride (SDF) has shown to be efficacious in arresting caries lesions. It is a valuable therapy which may be included as part of a caries management plan for patients. Caries lesions treated with SDF usually turn black and hard. Stopping the caries process in all targeted lesions may take several applications of SDF, and reapplication may be necessary to sustain arrest.

Treatment of incipient caries usually involves early therapeutic intervention using topical fluoride, and non-surgical restorative techniques such as dental sealants and resin infiltration. The use and outcomes of these techniques have been well-documented, and there are current policies and guidelines with recommendations for their use in the practice of dentistry. In contrast, treatment of caries lesions traditionally requires surgical intervention to remove diseased tooth structure followed by placement of a restorative material to restore form and function. Barriers to traditional restorative treatment (e.g., behavioural issues due to age and/or limited cooperation, access to care, financial constraints) call for other alternative caries management modalities.

SDF is thirty-eight percent SDF, which is equivalent to five percent fluoride in a colourless liquid, with a pH of ten. The exact mechanism of SDF is not understood. It is theorized that fluoride ions act mainly on the tooth structure, while silver ions, like other heavy metals, are antimicrobial.

It is also theorized that SDF reacts with hydroxyapatite in an alkaline environment to form Calcium Fluoride (CaF2) and silver phosphate as major reaction products. CaF2 provides sufficient fluoride to form fluorapatite which is less soluble than hydroxyapatite in an acidic environment. A side effect is the discoloration of demineralized or cavitated surfaces. Patients and parents should be advised regarding the black staining of the lesions associated with the application of SDF. Ideally, prior to use of SDF, parents should be shown before- and after- images of teeth treated with SDF.

The American Academy of Pediatric Dentistry (AAPD) recognizes that dental caries continues to be a prevalent and severe disease in children. Therefore, the aim of this guideline is to help practitioners (Pediatric dentist, General dentist) addresses the use of SDF as part of an ongoing caries management plan with the aim of optimizing individualized patient care consistent with the goals of a dental home.

2. SCOPE

2.1. The guideline intends to recommend the clinical practitioner involving the application of SDF to enhance dental caries management outcomes in children and adolescents, including people of determination.

3. PURPOSE

3.1. To help practitioners (Pediatrics dentist, General dentist) make decisions involving the application of SDF to enhance dental caries management

outcomes in children and adolescents, including those with special health care needs.

3.2. To teach the clinician (Pediatric dentist, General dentist) how to administer SDF in an effective, safe way.

3.3. To familiarizing the Pediatric dentist and General practitioner with the criteria for tooth selection for SDF.

3.4. Standardize the management of Dental Caries Lesions with SDF.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

4.2. DHA licensed General Dental Practitioners.

5. RECOMMENDATION ONE: CLINICAL STEPS

5.1. Patients who may benefit from SDF include those:

5.1.1. With high caries risk who have active cavitated caries lesions in anterior or posterior teeth.

5.1.2. Presenting with behavioural or medical management challenges and cavitated caries lesions.

5.1.3. With multiple cavitated caries lesions that may not all be treated in one visit.

5.1.4. With dental caries lesions that are difficult to treat.

5.1.5. Without access to or with difficulty accessing dental care.

5.1.6. In situations where aerosol generating procedures are avoided to decrease risk of contagion during disease outbreak.

5.2. Criteria for tooth selection include:

5.2.1. No clinical signs of pulpal inflammation or reports of unsolicited/spontaneous pain.

5.2.2. Cavitated caries lesions that are not encroaching on the pulp. If possible, radiographs should be taken to assess depth of caries lesions.

5.2.3. Cavitated caries lesions on any surface as long as they are accessible with a brush for applying SDF. (Orthodontic separators may be used to help gain access to proximal lesions).

5.2.4. SDF can be used prior to restoration placement and as part of caries control therapy. Informed consent, particularly high- lighting expected staining of treated lesions, potential staining of skin and clothes, and need for reapplication for disease control, is recommended.

5.3. Clinical application of SDF

5.3.1. Remove gross debris from cavitation to allow better SDF contact with denatured dentin.

5.3.2. Carious dentin excavation prior to SDF application is not necessary. As excavation may reduce proportion of arrested caries lesions that become black, it may be considered for aesthetic purposes.

5.3.3. A protective coating may be applied to the lips and skin to prevent a temporary henna-appearing tattoo that can occur if soft tissues come into contact with SDF.

5.3.4. Isolate areas to be treated with cotton rolls or other isolation methods. If applying cocoa butter or any other product to protect surrounding gingival tissues, use care to not inadvertently coat the surfaces of the caries lesions.

5.3.5. Caution should be taken when applying SDF on primary teeth adjacent to permanent anterior teeth that may have non-cavitated (white spot) lesions to avoid inadvertent staining.

5.3.6. Careful application with a micro-brush should be adequate to prevent intraoral and extra oral soft tissue exposure. No more than one drop of SDF should be used for the entire appointment.

5.3.7. Dry lesion with gentle flow of compressed air.

5.3.8. Bend micro sponge brush. Dip brush into SDF and dab on the side of the plastic dappen dish to remove excess liquid before application. Apply SDF directly to only the affected tooth surface. Remove excess SDF with gauze, cotton roll, or cotton pellet to minimize systemic absorption.

5.3.9. Application time should be at least one minute if possible. (Application time likely will be shorter in very young and difficult to manage patients. When using shorter application periods, monitor carefully at post-op and re-care to evaluate arrest and consider re-application).

5.3.10. Apply gentle flow of compressed air until medicament is dry. Try to keep isolated for as long as three minutes.

5.3.11. The entire dentition may be treated after SDF treatment with five percent sodium fluoride varnish to help prevent caries on the teeth and sites not treated with SDF.

5.4. Follow-up

5.4.1. Estimations of SDF effectiveness in arresting dental caries lesions range from 47 to 90 percent with one-time application depending on size of the cavity and tooth location. Anterior teeth have higher rates of arrest than posterior teeth. There- fore, follow-up for evaluation of caries arrest is advisable.

5.4.2. Follow-up at 2-4 weeks after initial treatment to check the arrest of the lesions treated.

5.4.3. Reapplication of SDF may be indicated if the treated lesions do not appear arrested (dark and hard). Additional SDF can be applied at recall appointments as needed, based on the colour and hardness of the lesion or evidence of lesion progression.

5.4.4. Caries lesions can be restored after treatment with SDF.

5.4.5. When lesions are not restored after SDF therapy, bi-annual re-application shows increased caries arrest rate versus a single application.

6. **RECOMMENDATION TWO:** SPECIAL CONSIDERATIONS

6.1. Potential adverse effects:

6.1.1. The main disadvantage of SDF is its aesthetic result (i.e., permanently blackens enamel and dentinal caries lesions and creates a temporary henna-appearing tattoo if allowed to come in contact with skin).

6.1.2. Skin pigmentation is temporary since the silver does not penetrate the dermis.

6.1.3. Desquamation of the skin with pigmentation occurs when keratinocytes are shed over a period of fourteen (14) days.

6.1.4. SDF also permanently stains most surfaces (e.g., counters, clothing) with which it comes into contact.

6.1.5. No allergic reactions to SDF except if patient has allergy to silver compounds, and might have pain if he had any oral ulcers (not recommended to apply if patient has ulcers or gingival inflammation).

C. GUIDELINES FOR THE APPLICATION OF HALL TECHNIQUE

1. BACKGROUND

The Hall Technique is a method for managing carious or hypoplastic primary molars where decay is sealed under Preformed Metal Crowns (PMCs) without local anesthesia, tooth preparation or any caries removal.

The technique is named after Dr. Norna Hall, a general dental practitioner from Scotland, who developed and used the technique for over 15 years until she retired in 2006. A retrospective analysis of the outcomes for the teeth she treated in this way was published in the British Dental Journal in 2006. This showed the technique to have outcomes comparable to conventional restorative techniques

Clinical trials have shown the Hall Technique to be effective, and acceptable to the majority of children, their parents and clinicians. It is not, however, an easy, quick fix solution to the problem of the carious primary molar. Like all clinical interventions, for success the Hall Technique requires careful and appropriate case selection, a high level of clinical skill, excellent patient management and long term monitoring. In addition, it must always be provided with a full and effective caries preventive program.

The Hall Technique manipulates the plaque's environment by sealing it into the tooth, separating it from the substrates it would normally receive from the oral environment. There is a possibility that the plaque may continue to receive some nutrition from perfusion through the dentinal tubules.

However, there is good evidence that if caries is effectively sealed from the oral environment, the bacterial profile in the caries changes significantly to a less cariogenic community, and the lesion does not progress.

Numerous studies have proven that the Hall technique outperforms the conventional counterpart with regards to longevity and patient compliance. It was found that Hall Technique was preferred to conventional restorations by the majority of the children, their parents, and dentists.

2. SCOPE

2.1. For the effective management of carious or hypoplastic primary molars where decay is sealed under preformed metal crowns (PMCs), without local anesthesia, tooth preparation or any caries removal.

3. PURPOSE

3.1. To improve compliance in young children and reduce anxiety associated with dental treatment (behavioural management technique).

3.2. To increase the use of SSCs by clinicians.

3.3. To avoid negative child health impacts and costs of repeat treatment.

3.4. To reduce tooth extraction and extensive treatment.

3.5. To be used in conjunction with a preventive program will reduce hospital admissions for dental treatment under general anesthesia.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

4.2. DHA licensed General Dental Practitioners.

5. **RECOMMENDATION ONE:** CASE SELECTION

5.1. With proper case selection, the Hall Technique can be an effective management option for primary molar teeth affected by dental caries. A full history and clinical examination, including bitewing radiography, should be carried out.

5.2. There should be a clear radiolucent band between the carious lesions and the pulp of the tooth intended to be restored with the Hall Technique. There should be no signs or symptoms of pulpal pathosis.

5.3. Indications include teeth with:

5.3.1. Proximal (Class II) lesions, cavitated or non-cavitated.

5.3.2. Occlusal (Class I) lesions, non-cavitated if the patient is unable to accept a fissure sealant, or conventional restoration.

5.3.3. Occlusal (Class I) lesions, cavitated if the patient is unable to accept partial caries removal technique, or a conventional restoration.

5.4. Contra indications for fitting Hall crowns include:

5.4.1. Signs or symptoms of irreversible pulpitis, or dental sepsis.

5.4.2. Clinical or radiographic signs of pulpal involvement, or periradicular pathology.

5.4.3. Insufficient sound tissue left to retain the crown.

5.4.4. Patient co-operation where the clinician cannot be confident that the crown can be fitted without endangering the patient's airway.

5.4.5. A patient at risk from bacterial endocarditis.

5.4.6. Parent or child unhappy with aesthetics. This should become apparent though at the treatment planning stage when treatment options are being discussed and agreed with the parent and child.

6. **RECOMMENDATION TWO:** STEPS FOR FITTING A HALL CROWN

6.1. Assessing the tooth shape, contact points/areas and the occlusion

6.1.1. Hall crowns can often be fitted successfully to primary molars that are in contact with adjacent teeth, as there is some elasticity in the periodontal ligament that can absorb the displacement necessary to fit the crown. Some teeth have very broad contact points, which can make fitting crowns difficult. In such cases, placing orthodontic separators through the mesial and distal contacts can be useful when fitting crowns with the Hall Technique. The patient seen 3 to 5 days later for removal of the separator and fitting of the crown.

6.1.2. Sometimes there would be difficulty in placement of crown due to crown morphology or marginal breakdown and tooth movement. There are several different approaches to manage this problem if a crown cannot be fitted in the usual way:

a. Placement of a temporary restoration to rebuild the marginal ridge and allow a separator to be placed to make space for the crown to be fitted.

b. Adjusting the crown with band forming pliers.

c. Trying a different crown: Use of a mandibular molar crown to fit a maxillary first primary molar with significant loss of mesiodistal width.

d. Carrying out some tooth preparation.

6.2. Protecting the airway

6.3. Sizing a crown

6.3.1. Select different sizes of crowns to find one that covers all the cusps, and approaches the contact points, with a slight feeling of "spring back". Aim to fit the smallest size of crown that will seat.

6.3.2. Be particularly careful not to fit an oversize crown to a second primary molar where the first permanent molar has still to erupt; this could increase the risk of first molar impaction later.

6.3.3. Do not be tempted to fully seat the crown through the contact points before cementation as they could be difficult to remove.

6.4. Loading the crown with cement

6.5. Fitting the crown, and first stage seating

6.6. Wipe the excess cement away, check fit, and second stage seating

6.7. Final clearance of cement, check occlusion (adjusting crown if necessary) and discharge.

7. **RECOMMENDATION THREE:** SPECIAL CONSIDERATIONS

7.1. Hall crowns should not be fitted to opposing (occluding) teeth during the same appointment. The occlusion should have re-established, with bilateral contacts,

before opposing crowns are fitted. However, if a primary molar on either side of the same arch needs a Hall crown (or diagonally opposite teeth in different arches, i.e. a maxillary left primary molar and a mandibular right primary molar), then these can (and ideally should) be fitted during the same appointment, as the patient will have two crowns fitted with just one episode of bite propping.

7.2. Crowns will try to follow the path of least resistance, and so may tilt towards the "easier" of the contacts, making it almost impossible then to ease the crown through the tight contact. Concentrate on seating the crown through the tight contact. The easy one should take care of itself.

7.3. If the crown does not seat sufficiently, then remove it using the excavator before the cement sets. If the cement has set, a high-speed hand piece can be used to section the crown through the buccal and occlusal surface, following which it can easily be peeled off.

7.4. Patients and parents should be reassured that the child would be used to the feeling within Twenty four (24) hours. Analgesia is usually not required. The occlusion tends to adjust to give even contact on both sides within weeks.

7.5. If fitting crowns to second primary molars, particularly in the maxilla, before the first permanent molars are erupted, keep an eye for the first permanent molars becoming impacted against the crown margin as they erupt. This can occur even if crowns have not been fitted. Nevertheless, if it does occur, it can often be managed with orthodontic separators if detected early.

7.6. If a primary molar fitted with Hall crown requires a pulp therapy, then this can be carried out through the crown without needing to remove it.

7.7. Patients should be reviewed on a normal recall schedule, with radiographic examination in line with current recommendations, and the Hall Technique should be used in conjunction with a full preventive programme.

D. GUIDELINES FOR THE USE OF LOCAL ANESTHESIA IN PEDIATRIC PATIENTS

1. BACKGROUND

Dental Local anaesthesia is the temporary loss of sensation including pain in one part of the body produced by a topically applied or injected agent without depressing the level of consciousness. Local anaesthetics act within the neural fibres to inhibit the ionic influx of sodium for neuron impulse. This helps to prevent transmission of pain sensation during procedures, which can serve to build trust and foster the relationship of the patient and dentist, allay fear and anxiety, and promote a positive dental attitude. The technique of local anaesthetic administration is an important consideration in pediatric patient behaviour guidance. Age-appropriate nonthreatening terminology, distraction, topical anaesthetics and proper injection technique can help the patient have a positive experience during administration of local anaesthesia.

In Pediatric dentistry, the dental professional should be aware of proper dosage (based on weight) to minimize the chance of toxicity and the prolonged duration of anaesthesia, which can lead to accidental lip, tongue, or soft tissue trauma.

Therefore, the aim of this guideline is to help practitioners (Pediatric dentist, General dentist) make decisions when using local anaesthesia to control pain in infants, children, adolescents, and individuals with special health care needs during the delivery of oral healthcare.

2. SCOPE

2.1. The scope of this guideline aims at familiarizing the Pediatric dentist and general practitioner with most effective and safe techniques for administration of local anaesthesia in the Pediatric dental patient. Therefore, it is important that dentists make every effort to minimize pain and discomfort during dental treatment.

3. PURPOSE

3.1. To help practitioners (Pediatric dentist, General dentist) make decisions when using local anaesthesia to control pain in infants, children, adolescents, and individuals with special health care needs during the delivery of oral health care.

3.2. To ensure safe, atraumatic, and effective administration of local anaesthesia injection to a child.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

4.2. DHA licensed General Dental Practitioner.

5. RECOMMENDATION ONE: TOPICAL ANESTHETICS

5.1. The application of a topical anaesthetic may help minimize discomfort caused during administration of local anaesthesia. Topical anaesthetic is effective on surface tissues (up to two to three mm in depth) to reduce painful needle penetration of the oral mucosa. Topical anaesthetic agents are available in gel, liquid, ointment, patch, and aerosol forms.

5.2. Topical anesthetic may be used prior to the injection of a Local Anesthetic (LA) to reduce discomfort associated with needle penetration.

5.3. The pharmacological properties of the topical agent should be understood.

5.4. A metered spray is recommended if an aerosol preparation is selected.

5.5. Systemic absorption of the drugs in topical anesthetics must be considered when calculating the total amount of anesthetic administered.

6. **RECOMMENDATION TWO:** SELECTION OF SYRINGES AND NEEDLES

6.1. The American Dental Association (ADA) has long-standing standards for aspirating syringes for use in the administration of local anesthesia. Needle selection should allow for profound local anesthesia and adequate aspiration.

6.2. These recommendations may include:

6.2.1. For the administration of local dental anesthesia, dentists should select aspirating syringes that meet ADA standards.

6.2.2. Short needles may be used for any injection in which the thickness of soft tissue is less than 20 millimetres. A long needle may be used for a deeper injection into soft tissue. Any 23- through 30- gauge needle may be used for intraoral injections, since blood can be aspirated through all of them. Aspiration can be more difficult, however, when smaller gauge needles are used. An extra-short, 30-gauge is appropriate for certain infiltration injections.

6.2.3. Needles should not be bent if they are to be inserted into soft tissue to a depth of greater than five millimeters or inserted to their hub for injections to avoid needle breakage.

7. **RECOMMENDATION THREE:** INJECTABLE LOCAL ANESTHETIC (LA) AGENTS

7.1. Local amide anesthetics available for dental usage include lidocaine, mepivacaine, articaine, prilocaine, and bupivacaine. Absolute contraindications for LA include a documented LA allergy. True allergy to an amide is exceedingly rare.

7.2. For patients having an allergy to bisulfates, use of a LA without a vasoconstrictor is indicated. LA without vasoconstrictors should be used with caution due to rapid systemic absorption, which may result in overdose.

7.3. A long-acting LA (i.e., bupivacaine) is not recommended for the child or the physically or mentally disabled patient due to its prolonged effect, which increases the risk of soft tissue injury.

7.4. Selection of LA agents should be based upon:

7.4.1. The patient's medical history and mental/developmental status.

7.4.2. The anticipated duration of the dental procedure.

7.4.3. The need for haemorrhage control.

7.4.4. The planned administration of other agents (e.g., nitrous oxide, sedative agents, general anaesthesia).

7.4.5. The practitioner's knowledge of the aesthetic agent.

7.5. Use of vasoconstrictors in LA is recommended to decrease the risk of toxicity of the anesthetic agent, especially when treatment extends to two or more quadrants in a single visit.

7.6. In cases of bisulphate allergy, use of a LA without a vasoconstrictor is indicated. A LA without a vasoconstrictor also can be used for shorter treatment needs but should be used with caution to minimize the risk of toxicity of the anesthetic agents.

7.7. The established maximum dosage for any anesthetic should not be exceeded.

7.8. Administration of LA should be based on the weight/body mass index (BMI) of the patient.

8. **RECOMMENDATION FOUR:** DOCUMENTATION OF LOCAL ANESTHESIA

8.1. The patient record is an essential component of the delivery of competent and quality oral health care. Appropriate documentation includes specific information relative to the administration of local anesthesia.

8.2. These recommendations may include:

8.2.1. Documentation must include the type and dosage of LA. Dosage of vasoconstrictors, if any, must be noted.

8.2.2. Documentation may include the type of injection(s) given (e.g., infiltration, block, intraosseous), needle selection, and patient's reaction to the injection.

8.2.3. In patients for whom the maximum dosage of LA may be a concern, the weight should be documented preoperatively.

8.2.4. If the LA was administered in conjunction with sedative drugs, the doses of all agents must be noted on a time-based record.

8.2.5. Documentation should include that post-injection instructions were reviewed with the patient and parent.

9. RECOMMENDATION FIVE: LA COMPLICATIONS

9.1. Toxicity (overdose):

9.1.1. Most adverse drug reactions develop either during the injection or within five to 10 minutes. Overdose of LA can result from high blood levels caused by a single inadvertent intravascular injection or repeated injections.

9.1.2. LA toxicity can be prevented by careful injection technique, watchful observation of the patient, and knowledge of the maximum dosage based on weight. Practitioners should aspirate before every injection and inject slowly.

9.2. Allergy to local anaesthesia:

9.2.1. Allergic reactions are not dose related but are due to the patient's heightened capacity to react to even a small dose. Allergies can manifest in a variety of ways, some of which include urticaria, dermatitis, angioedema, fever, photosensitivity, or anaphylaxis. Anesthetic toxicity can be prevented by careful injection technique, watchful observation of the patient, and knowledge of the maximum

dosage based on weight. Practitioners should aspirate before every injection and inject slowly.

9.3. Paraesthesia:

9.3.1. Paraesthesia is persistent anesthesia beyond the expected duration. Trauma to the nerve can result in paresthesia and, among other etiologies; the needle can cause trauma during the injection.

9.4. Postoperative soft tissue injury:

9.4.1. Self-induced soft tissue trauma is an unfortunate clinical complication of LA use in the oral cavity. Most lip and cheek-biting lesions of this nature are self-limiting and heal without complications, although bleeding and infection are possible.

9.4.2. Caregivers responsible for postoperative supervision should be given a realistic time for duration of numbness and informed of the possibility of soft tissue trauma.

9.5. Recommendations to reduce local anaesthetic complications:

9.5.1. Practitioners who utilize any type of local anaesthetic in a Pediatric dental patient should have appropriate training, skills, and have available the proper facilities, personnel, and equipment to manage any reasonably foreseeable emergency.

9.5.2. Care should be taken to ensure proper needle placement during the intraoral administration of LAs. Practitioners should aspirate before every injection and inject slowly.

9.5.3. Residual soft tissue anesthesia should be minimized in pediatric and special health care needs patients to decrease risk of self-inflicted postoperative injuries.

9.5.4. Following an injection, the doctor, hygienist, or assistant should remain with the patient while the anesthetic begins to take effect.

9.5.5. Practitioners should advise patients and their caregivers regarding behavioural precautions (e.g., do not bite or suck on lip/cheek, do not ingest hot substances) and the possibility of soft tissue trauma while anesthesia persists. Placing a cotton roll in the mucobuccal fold may help prevent injury and lubricating the lips with petroleum jelly helps prevent drying. Practitioners who use pheytolamine mesylate injections to reduce the duration of local anesthesia still should follow these recommendations.

10. **RECOMMENDATION SIX:** LOCAL ANASTHESIA WITH SEDATION, GENERAL ANASTHESIA, AND/OR NITROUS OXIDE/OXYGEN ANALGESIA/ANXIOLYSIS

10.1. Particular attention should be paid to local anaesthetic doses used in children .To avoid excessive doses for the patient who is going to be sedated, a maximum recommended dose based upon weight should be calculated .

10.2. The dosage of local anaesthetic need not be altered if nitrous oxide/oxygen analgesia/anxiolysis administered.

10.3. When general anaesthesia is employed, local anaesthesia may be used to reduce the maintenance dosage of the anaesthetic drugs. The anaesthesiologists

should be informed of the type and dosage of the local anaesthetic used.

Recovery room personnel also should be informed.

E. GUIDELINES FOR NITROUS OXIDE (N_2O) INHALATION SEDATION

1. BACKGROUND

All children should expect pain free, high quality dental care, which can be achieved with sedation for some children that exhibit behavior challenges. When sedation is used there is an additional, separate need for pain control in form of local anesthesia and behavior management.

Pain and anxiety management is of paramount importance in dentistry. As many as 10-30% of adults and children may have some form of fear or anxiety related to dental treatment. There is substantial evidence that these patients will benefit from sedation with Nitrous oxide (N_2O) and that this form of sedation is extremely safe and efficient in the trained dental practitioner's hands.

N_2O conscious sedation is defined as diminution or elimination of pain and anxiety in a conscious patient. The patient responds normally to verbal commands. All vital signs are stable, there is no significant risk of losing protective reflexes, and the patient is able to return to pre-procedure mobility. N_2O is a colourless and virtually odourless gas with a faint, sweet smell. It is an effective analgesic/anxiolytics agent causing Central Nervous System (CNS) depression and euphoria with little effect on the respiratory system. N_2O is absorbed rapidly, allowing for both rapid onset and recovery (2-3 minutes). It causes minimal impairment of any reflexes, thus protecting the cough reflex. Although rare, silent regurgitation and subsequent aspiration need to be considered with N_2O/Oxygen (O_2) sedation.

2. SCOPE

2.1. For the effective and successful conscious sedation with N_2O of pediatric patients in clinical practice.

3. PURPOSE

3.1. To reduce or eliminate anxiety.

3.2. To minimize psychological trauma related to early dental treatment.

3.3. To enhance communication and patient cooperation.

3.4. To increase tolerance for longer appointments.

3.5. To reduce gagging.

3.6. To reduce costs related to repeat treatment.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

5. **RECOMMENDATION ONE:** SEDATION IN PEDIATRIC DENTISTRY

5.1. In contrast to adult sedation, in children the procedure has the objective of controlling behaviour and achieving complete treatment in a safe and efficient way.

5.2. The child's cooperation and the Pediatric Dentist's behaviour guidance may vary according to the child's age.

6. **RECOMMENDATION TWO:** TRAINING FOR N_2O SEDATION

6.1. The pediatric dentist shall be granted Clinical Privilege to provide N_2O sedation by the Clinical Privileging Committee (CPC) or Medical Director of the health

facility aligned with his/her training credentials and qualifications, training, competence, practical independence and experience.

6.2. A health facility should apply to HRS to provide clinical training for N_2O sedation and should fulfil all criteria mentioned in the Guidelines for Clinical Training Facilities on the DHA website.

6.3. Training of pediatric dentists in N_2O sedation should include theoretical training as well as practical training.

6.4. Training and experience should be regularly updated and maintained.

6.5. The clinical privileged pediatric dentists should:

6.5.1. Have current Pediatric Advanced Life Support (PALS)/Pediatric Emergency Assessment, Recognition and Stabilization (PEARS).

6.5.2. Have an ability to rescue patient whose level of sedation becomes deeper than initially intended.

6.5.3. Have the knowledge for the management of complications due to conscious sedation.

6.6. Dental auxiliary personnel assisting during conscious sedation sessions shall also have appropriate but shorter training and theory and practical training in basic life support.

7. **RECOMMENDATION THREE:** PATIENT SELECTION

7.1. The selection of the patient is based on a careful clinical examination and a well-documented medical and dental history elaborated by the Pediatric Dentist.

7.2. Determination of risk factors and a better understanding of the patient's profile are mandatory.

7.3. If a single risk factor is found, an anaesthesiologist must be consulted in order to decide whether the patient can be submitted to the sedative procedure. Patients must be classified according to the American Society of Anesthesiologists (ASA) classifying system as shown in **Table 1** below.

Table 1 - American society of anesthesiologists (ASA) physical status classification evaluation	
ASA Classification	
Class I	No organic, physiological, biochemical or psychiatric alterations
Class II	Moderate systemic alterations (diabetes, asthma)
Class III	Severe systemic alterations (acute diabetes, psychomotor retardation, severe pulmonary failure)
Class IV	Severe alterations that may endanger life (heart failure)
Class V	Moribund patient with no chances of surviving a surgery

7.4. Sedation with N_2O can be performed in ASA III and ASA IV patients, provided its use is restricted to hospitals and under the supervision of a responsible anaesthesiologist.

Note: Refer to the clinical pathway decision making process of N_2O administration in **Appendix 1.**

8. **RECOMMENDATION FOUR:** INDICATIONS

8.1. The most common indications are discussed:

8.1.1. Patients showing low to moderate apprehensive behaviour, capable of understanding and following simple instructions.

8.1.2. Patients aged four or over, although there is support for a minimum age of six or eight, depending on how well the child cooperates with the basic behaviour techniques.

8.1.3. Patients with a severe vomiting reflex that makes the dental treatment otherwise impossible.

8.1.4. Special patients who present physical or mental disorders.

8.1.5. Patients who require more sitting time because of complex or multiple treatments.

8.1.6. Invasive medical diagnoses and minor surgeries.

8.1.7. A fearful, anxious patient.

8.1.8. A patient whose gag reflex interferes with dental care.

8.1.9. ASA Class I patients (**Table 1**).

9. **RECOMMENDATION FIVE:** CONTRAINDICATION

9.1. Non-cooperative patients who exhibit a highly anxious and apprehensive profile.

9.2. Hysterical, stubborn or defiant patients who refuse the mask due to age, maturity, behaviour or personality disorder.

9.3. Psychotic or drug addicted patients, due to the influence of severe emotional disorder.

9.4. Patients with upper respiratory tract infection, Chronic Obstructive Pulmonary Disease (COPD), acute otitis, sinusitis or a recent (less than two weeks) ear, nose or throat operation, under chemotherapy with bleomycin4 or with porphyria.

9.5. Some COPD.

9.6. ASA II, III, IV, V.

10. **RECOMMENDATION SIX:** PATIENT ASSESSMENT

10.1. The dentist must conduct a thorough patient assessment to cover the following, but not limited to:

10.1.1. Medical History including prescribed medication,

10.1.2. Dental History,

10.1.3. Assessment of anxiety level,

10.1.4. Previous conscious sedations and general anesthesia,

10.1.5. Indication for the use of conscious sedation,

10.1.6. Pre-sedation assessment,

10.1.7. Drug allergies.

11. **RECOMMENDATION SEVEN:** PATIENT INFORMATION

11.1. The pediatric dentist must document, but not limited to the following:

11.1.1. Parents/Guardian's nitrous oxide sedation informed consent,

11.1.2. Pre-procedure assessment record,

11.1.3. Monitoring record,

11.1.4. Post procedure record.

11.2. Pre-operative Instruction

11.2.1. Fasting is not required for patients undergoing N_2O analgesia/anxiolytics. The practitioner, however, may recommend that only a light meal be consumed in the two (2) hours prior to the administration of N_2O.

11.3. Post-operative Information

11.3.1. The patient shall be accompanied to and from the treatment facility by a parent, legal guardian, or other responsible person. It is preferable to have two (2) or more adults accompany children who are still in car safety seats if transportation to and from a treatment facility is provided by one (1) of the adults.

11.4. Restraint

11.4.1. If immobilization devices are used, such as papoose boards, it must be applied in such a way as to avoid airway obstruction or chest restriction.

11.4.2. If an immobilization device is used, a hand or foot should be kept exposed, and the child should never be left unattended.

11.4.3. Oral or written consent is required for use of any type of restraint.

11.5. Patient monitoring

11.5.1. A dentist, or at the dentist's direction, an appropriately trained individual, must remain in the treatment room during active dental

treatment, to monitor the pediatric patient continuously until the patient meets the criteria for discharge.

11.5.2. The appropriately trained individual must be familiar with monitoring techniques and equipment.

11.5.3. Monitoring must include:

a. **Oxygenation**

I. Colour of mucosa, skin or blood must be evaluated continually.

II. O_2 saturation by pulse oximetry may be clinically useful and should be considered.

b. **Ventilation**

I. The dentist and/or appropriately trained individual must observe chest excursions continually.

c. **Circulation**

I. Heart rate should be evaluated pre-operatively, intra-operatively and postoperatively.

II. Blood pressure readings can be obtained pre and post operatively.

d. **Discharge Criteria**

I. The qualified dentist or appropriately trained clinical staff must monitor the patient during recovery until the patient is ready for discharge by the dentist.

II. The qualified dentist must determine and document that level of consciousness; oxygenation, ventilation and circulation are satisfactory prior to discharge.

III. The instruction must be given written and verbal to the patient, parent, escort, guardian or care giver on the following:

- Appropriate diet,
- Medications,
- Management of possible postoperative bleeding,
- Level of activity,
- Pre and Post-operative,
- Post-sedation assessment and time of discharge home

Table 2 is a sedation scale that can be used to monitor the effect of the sedation.

Table 2- Sedation scale according to Wilton (8)	
Agitated	Clinging to parent and/or crying
Alert	Awake but not clinging to parent, may whimper but not cry
Calm	Sitting or lying comfortable with eyes spontaneous open
Drowsy	Sitting or lying comfortable with eyes spontaneous closing but responds to minor stimulation
Asleep	Eyes closed, rousable but does not respond to minor stimulation

a. **Documentation and records**- It is recommended that the documentation include the following:

I. N_2O Sedation informed consent,

II. Patient education form about sedation, pre and post operatively instruction,

III. Pre-assessment record,

IV. Intra-operative record,

V. Recovery record,

VI. Patient response to N_2O,

VII. The course of the treatment,

- Monitoring
- Dose, and route of administration of sedative drugs
- Dental treatment performed
- Sedation evaluation (sedation scale)
- Accept of sedation and treatment (behavioural scale)
- Complications

VIII. Discharge record.

12. RECOMMENDATION EIGHT: TECHNIQUES OF N_2O/O_2 SEDATION

12.1. Perform time-out.

12.2. Selection of an appropriately sized nasal hood.

12.3. A flow rate of 5 to 6 L/min.

12.4. Introduction of 100% O_2 for 1 to 2 minutes followed by titration of N_2O in 10% intervals.

12.5. The concentration of N_2O should not routinely exceed 50% at any point of time.

12.6. During treatment, it is important to continue the visual monitoring and documenting of the patient's vital signs, respiratory rate and level of consciousness.

12.7. Once the N_2O flow is terminated, 100% O_2 should be delivered for 3 to 5 minute to avoid diffusion hypoxia.

12.8. Discontinue if nausea, light-headedness or other side effects occur.

12.9. The patient must meet the discharge criteria and return to pre-treatment responsiveness before discharge.

13. RECOMMENDATION NINE: PATIENT MONITORING

13.1. During the procedure $Sp0_2$/Pulse/Nitrous oxide-Oxygen Percentage/Sedation Score must be monitored.

13.2. After the procedure the $Sp0_2$/Pulse/Temperature/BPI/Sedation Score must be monitored.

14. RECOMMENDATION TEN: ADVERSE EFFECTS OF N_2O INHALATION

14.1. Nausea and vomiting are the most common adverse effects.

14.2. A higher incidence with longer administration of nitrous oxide, fluctuations in N_2O levels, and increased concentrations of N_2O.

15. RECOMMENDATION ELEVEN: DISCHARGE CRITERIA

15.1. Patient must meet the discharge criteria and vital signs return to pre-procedure readings.

15.2. Post-operative verbal and written instructions must be given to the patient, parent, escort, guardian or caregiver.

15.3. Modified discharge criteria Post Anesthesia Discharge Scoring System (PADS) for determining home readiness of the patient must be completed and patients are ready to discharge home if the total score > 11.

Modified discharge criteria (PADS)					
Breathing	Able to breathe deeply and coughing	2	**Circulation**	BP is ±20% of the pre-procedural initial value	2
	Dyspnoea or shortness of Breath	1		BP is ±20% to 50% of the pre-procedural initial value	1
	Apnoea	0		BP is >±50% of the pre-procedural initial value	0
Level of consciousness	Fully conscious	2	**O_2 Saturation**	Able to maintain SaO_2 > 92% on Room air	2
	Responding to verbal command	1		Needs O2 therapy to maintain SaO2 >92%	1
	Not responding	0		SaO_2 <92% even with O_2 therapy	0
Nausea & Vomiting	No or minimal	2	**Pain**	No or minimal	2
	Moderate	1		Moderate	1
	Severe	0		Severe	0

16. RECOMMENDATION TWELVE: SAFETY OF STAFF

16.1. Chronic exposure to trace concentrations of N_2O has been reported to constitute an occupational health hazard. Consequently, the dental staff must

follow strict indications for the use of nitrous oxide, only use N_2O delivery systems with an efficient scavenging system, have appropriate technique for disconnection of the delivery system, and have methods for testing the integrity of the breathing system.

17. RECOMMENDATION THIRTEEN: EQUIPMENT

17.1. The various equipment required in N_2O administration are enlisted below:

17.1.1. Appropriately fitting nasal hood.

17.1.2. Fail-safe Mechanism that is checked and calibrated regularly and documented

17.1.3. Inhalation equipment must have the capacity for delivering 100%, and never less than 30%, O_2 concentration at a flow rate appropriate to the child's size.

17.1.4. If N_2O/ O_2 delivery equipment capable of delivering more than 70% N_2O and less than 30% O_2 is used, an inline O_2 analyser must be used.

17.1.5. Equipment should be current, accurate and include a scavenging system.

17.1.6. Emergency cart must be able to accommodate children of all ages and sizes. It should include equipment to resuscitate a non-breathing, unconscious patient and provide continuous support until trained emergency personnel arrive.

17.1.7. A positive pressure oxygen delivery system capable of administering >90% O_2 at a 10 L/min flow for at least 60 minutes (650 L, "E" cylinder) must be available.

17.1.8. Documentation of emergency equipment and drugs regularly on scheduled basis.

17.1.9. Inspect pressure connections for absence of leaks.

17.1.10. Inspect the conducting tubing and reservoir bag to the unit if not already in place.

17.1.11. Connect the conducting tubing and reservoir bag to the unit if not already in place.

17.1.12. Make sure to have replacement equipment and cylinders on hand.

17.1.13. Ensure the cylinder colour should be different from other cylinder such as oxygen and Liquid Petroleum Gas (LPG). Oxygen Cylinder should be black and Nitrous oxide Cylinder should be Blue.

17.1.14. Infection control.

a. The equipment used for inhalation sedation must be prevented from causing cross infections. During use, various parts of the equipment will be contaminated to some extent.

b. The nasal hood/masks are in direct contact with the patient's skin around the nose and upper lip, which will be carrying a variety of microorganisms. Therefore, it is recommended to use a single use, disposable nasal hoods/mask or which can be autoclave.

c. The scavenger breathing system and reservoir bags should be sterilized/disinfected as per the manufacturer's instruction.

d. Disinfect re-usable equipment such as connecting tubes after each patient use.

e. Any part of the tubing that is not corrugated can be sterilized but is not necessary. Surface disinfection is adequate.

17.1.15. Storage of equipment.

a. Nitrous oxide equipment must be stored in a secure, locked space.

F. GUIDELINES FOR COMPLETE ORAL REHABILITATION UNDER GENERAL ANAESTHESIA

1. BACKGROUND

Pediatric dentists seek to provide oral healthcare to infants, children, adolescents and persons with special healthcare needs in a manner that promotes excellence in quality of care and concurrently induces a positive attitude in the patient toward dental treatment. Behavior guidance techniques have allowed most pediatric dental patients to receive treatment in the dental office with minimal discomfort and without expressed fear. Minimal or moderate sedation has allowed others who are less compliant to receive treatment. Some children and individuals with special care needs who have extensive oral healthcare needs, acute situational anxiety, uncooperative behavior, immature cognitive functioning, disabilities, or medical conditions require deep sedation/General Anesthesia (GA) to receive dental treatment in a safe and humane fashion.

GA is a clinician-controlled state of patient unconsciousness accompanied by a loss of protective reflexes, including the ability to maintain an airway independently and respond purposefully to physical stimulation or verbal command. The use of GA sometimes is necessary to provide quality dental care for the child.

The Dubai Health Authority recognizes that using non-pharmacological behavior guidance techniques in certain patients may sometimes present a challenge for the pediatric dentist in the dental clinic; hence, GA is required to undergo comprehensive dental procedures safely in those patients.

2. SCOPE

2.1. Establish a clear recommendations and protocol to be practiced by all Pediatric Dentists in order to provide quality dental care that is standardized, successful and efficient when referring to and performing complete oral rehabilitation under GA in children.

3. PURPOSE

3.1. To reduce or eliminate anxiety.

3.2. To minimize psychological trauma related to early dental treatment.

3.3. To increase tolerance for longer appointments.

3.4. To reduce gagging.

3.5. To reduce costs related to repeat treatment.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

5. RECOMMENDATION ONE: BENEFITS COMPLETE ORAL REHABILITATION UNDER GA

5.1. Improvement in the quality of life by treatment of extensive dental disease in children who are experiencing pain and difficulties in eating and sleeping.

5.2. Facilitating quality dental care for medically compromised patients with special health care needs.

5.3. Allowing the treatment of anxious, defiant and fearful children who exhibit uncooperative behaviour on the dental chair thus protecting their developing psyche.

6. **RECOMMENDATION TWO:** PATIENT SELECTION CRITERIA

6.1. When considering the use of GA, the following general considerations need to be taken into account:

6.1.1. Children who cannot cooperate due to lack of psychological or emotional maturity and/or mental, physical, or other medical disability.

6.1.2. The extremely uncooperative, fearful, anxious, or uncommunicative child or adolescent.

6.1.3. Patients for whom local anesthesia is ineffective because of acute infection, anatomic variations, or allergy.

6.1.4. Patients requiring immediate, comprehensive oral/dental care.

6.1.5. Patients requiring significant surgical procedures.

6.1.6. Patients for whom the use of GA may protect the developing psyche and/or reduce medical risk.

7. **RECOMMENDATION THREE:** PATIENT EXCLUSION CRITERIA

7.1. Patients less than three (3) years old that require short dental treatment or asymptomatic cases where treatment can be delayed until child is older or more cooperative.

8. **RECOMMENDATION FOUR:** PRE-OPERATIVE ASSESSMENT (PROTOCOL OF REFERRAL)

8.1. The pediatric dentist must first assess the child and confirm if they meet the criteria for complete oral rehabilitation under GA.

8.2. A provisional treatment plan must be formulated and discussed with the parents after clinical evaluation and/or radiographic examination (if possible and age appropriate).

8.3. The referring pediatric dentist must rule out the following:

8.3.1. If the child is medically compromised a medical fitness letter from the concerned physician must be obtained before referral for complete oral rehabilitation under GA. The referring pediatric dentist should communicate any special instructions from the child's physician regarding the treatment under GA in the patient's health record.

8.3.2. Involvement of the first permanent molars; an appropriate consultation must be done with oral surgery, an endodontist or orthodontist before referral for GA.

8.3.3. If any teeth require root canal therapy, the prognosis and restorability of the involved teeth must be confirmed with the endodontist. Such cases must be planned in advance before scheduling the patient for GA.

8.3.4. If any permanent molars require extraction, an orthodontist must be consulted to confirm the treatment plan. A consultation with an oral surgeon must be done in case of any anticipated complicated extractions otherwise simple extraction of permanent first molars can be performed by the pediatric dentist.

9. **RECOMMENDATION FIVE:** PRE-OPERATIVE INVESTIGATIONS

9.1. Prior to undergoing GA, all patients must have the following investigations:

9.1.1. Blood investigations Full Blood Count,

9.1.2. Hepatitis B Surface Antigen,

9.1.3. HIV Antigen and Antibody,

9.1.4. Referral to Pre-anesthesia clinic,

9.1.5. All the necessary information such as admission protocol, importance of having anesthesia check-up appointment prior to GA day, failure to attend the anesthesia check-up appointment and cancellation of GA must be explained to the patient's parent/guardian.

10. RECOMMENDATION SIX: TREATMENT UNDER GA

10.1. Operating doctor must confirm the final or provisional treatment plan with the parent on the day of operation. Parents must be specifically informed about treatment with metal crowns, extractions of permanent teeth or extraction of primary anterior teeth with or without temporary prosthetic replacement.

10.1.1. Restorations:

a. Any small occlusal lesions can be restored using composite or compomer restorative material if the lesion is confined to the occlusal surface only. Any deep fissures on molars can be sealed with flowable composite material.

b. Class II restorations in primary molars should NOT be performed under GA.

c. Multi-surface carious lesions in primary molars should be restored with stainless steel crowns and using strip crowns for anterior teeth.

d. Extensive carious lesions and/or enamel defects in permanent first molars must be restored with stainless steel crowns.

e. A root canal treated permanent first molar must be restored with stainless steel crown.

f. Glass Ionomer material should not be used as final restorative material unless justified.

10.1.2. Root Canal Therapy:

a. Standard root canal therapy of primary molars must be followed, which includes performing the pulpotomy and filling using IRM temporary filling followed by stainless steel crown.

b. Root canal therapy (pulpotomy/pulpectomy) should not performed on primary teeth with history of abscess, facial cellulitis and root resorption of more than 1/3 of the tooth.

c. Root canal treated permanent molars and permanent anterior teeth require full coverage using stainless steel crowns for molars and composite strip/celluloid crowns for anterior teeth.

10.1.3. Extractions:

a. All non-restorable teeth should be extracted under GA.

b. Balanced extraction of anterior teeth especially canines must be considered.

c. Sutures are advised after all extractions. A hemostatic agent such as surgicel can be used in combination with sutures in cases of persistent bleeding and/or children with coagulation disorders.

10.1.4. Space Maintainers:

a. Space maintainer impressions could be taken during or after complete oral rehabilitation under GA especially before the eruption of first permanent molars and in very young children.

10.1.5. Duration of Procedure:

a. Duration of routine procedure should not exceed ninety (90) minutes. However, in case the procedure extended beyond that, then the reason should be justified.

11. RECOMMENDATION SEVEN: DISCHARGE AND POST-OPERATIVE CARE

11.1. The responsibility of discharging the patient post-operatively is shared between the dentist, the anaesthesiologist and the nursing staff.

11.2. The discharge policies of the hospital are to be followed in addition to the following:

11.2.1. The patient's parents should receive verbal and written post-operative instructions especially if extractions or any surgical procedure has been performed.

11.2.2. Advice should be given about any symptoms that might be experienced by the patient in the first twenty four (24) hours following discharge.

11.2.3. Analgesics such as paracetamol or Ibuprofen are recommended and should be prescribed to the patient for use in the first twenty four (24) to forty eight (48) hours post-operatively.

11.2.4. Oral hygiene instructions should be reemphasized and oral care post-operatively should be explained clearly.

11.2.5. The patient should be scheduled for post- operative follow up with the operating pediatric dentist to ensure healing and the status of any absorbable (dissolving) sutures in addition to taking impressions for space maintainers if indicated.

G. GUIDELINES FOR MANAGEMENT OF EARLY CHILDHOOD CARIES

1. BACKGROUND

Oral health is an essential part of overall health and thus Pediatricians have a responsibility to include oral health as a part of their overall assessment of children. Providing oral healthcare requires a specific level of knowledge to facilitate communication, referral, collaboration and ongoing follow-up and care.

Dental caries in preschool children or Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary (milk) teeth. Dental caries among children is reported to occur between 5 to 8 times more frequently than asthma. It can result in considerable suffering, pain, reduction of quality of life of affected children and disfigurement and can frequently compromise their future dentition.

The etiology of the condition is a combination of:

- Frequent consumption of fermentable carbohydrates as liquids, especially at night, usually as a result of on-demand breast- or bottle-feeding,
- Oral colonization by cariogenic bacteria (especially Gram Positive Mutans Streptococci) and
- Poor oral hygiene.

The prevalence of ECC worldwide has been reported to vary between 3% and 94%. In the United Arab Emirates (UAE), ECC is by far the most common childhood disease and its prevalence of ECC has been reported as 93.8% in 5 year old children.

Primary Physicians and Pediatricians are in a unique position to ensure that patients and other caregivers receive information on the prevention of oral disease in infants and young children. By working together, Pediatricians and family physicians can

complement each other's efforts to provide comprehensive preventive oral care to their population. Moreover, they must have adequate knowledge of the disease process, its etiology, risk factors, clinical presentation, prevention and intervention strategies. Therefore, this guideline aims to provide an up-to-date information on terminology, etiology, prevalence, clinical picture and preventive strategies of early childhood caries.

2. SCOPE

2.1. To provide an overview on early childhood caries and timely referral of pediatric patients for appropriate oral treatment.

3. PURPOSE

3.1. To increase knowledge of oral disease prevention from infancy through adolescence.

3.2. To improve the quality of oral health in pediatric patients.

3.3. To reduce costs related to repeat treatment.

4. APPLICABILITY

4.1. DHA licensed Pediatric dentists.

4.2. DHA licensed General Dental Practitioners.

5. **RECOMMENDATION ONE:** ETIOLOGY OF EARLY CHILDHOOD CARIES (ECC)

5.1. Dental caries is a common chronic infectious transmissible disease resulting from tooth- adherent specific bacteria, primarily Mutans Streptococci (MS) that metabolize sugars to produce acid which, over time, demineralizes tooth structure.

5.2. MS generally is considered to be the principal group of bacterial organisms responsible for the initiation of dental caries.

5.3. MS colonization of an infant may occur from the time of birth. Significant colonization occurs after dental eruption as teeth provide non-shedding surfaces for adherence. Other surfaces also may harbor MS, For example, the furrows of the tongue.

5.4. Vertical transmission of MS from mother to infant is well documented. The higher the levels of maternal salivary MS, the greater the risk of the infant being colonized. Along with salivary levels of MS, mother's oral hygiene, periodontal disease, snack frequency, and socioeconomic status also are associated with infant colonization.

5.5. Reports indicate that horizontal transmission (i.e., between members of a group such as siblings of a similar age or children in a day-care center) may also be of concern.

5.6. The child's cooperation and the Pediatric Dentist's behaviour guidance may vary according to the child's age.

6. **RECOMMENDATION TWO:** CLINICAL REPRESENTATION OF EARLY CHILDHOOD CARIES

6.1. In most cases of ECC, the first clinical sign is a band of dull white demineralization along the gingival line of the maxillary incisor teeth.

6.2. As the lesion progresses, the white bands develop into brown or black cavities around the necks of the incisors. In severe cases, the crowns of the teeth are amputated leaving only root stumps.

6.3. The most commonly affected teeth are the maxillary incisors. The mandibular incisors are usually not affected because the teat of the bottle is usually held above the tongue during sucking, so the lower incisors are protected by the tongue and also by the flow of saliva from the submandibular ducts.

6.4. The commonly involved surfaces are the labial, palatal, mesial, distal of maxillary incisors and of the maxillary and mandibular canines. In the first and second primary molars, the occlusal surface is commonly affected.

7. **RECOMMENDATION THREE:** CONSEQUENCES OF ECC

7.1. Caries in primary teeth can affect children's growth, cause significant tooth pain and potentially life threatening infections, all of which can and diminish overall quality of life.

7.2. Untreated ECC lesions may cause abscess, cellulitis and spread of infection, which may result in serious and fatal complications such as brain abscess and Ludwig's angina.

7.3. Management of ECC complications requires increased emergency room visits and hospitalization. The socio-economic consequences of ECC manifest in increased treatment costs and missing school time as well as time off from employment for parents.

8. **RECOMMENDATION FOUR:** MANAGEMENT OF ECC

8.1. Dental caries is a disease that generally is preventable. Early risk assessment allows for identification of parent-infant groups who are at risk for ECC and would benefit from early preventive intervention. The ultimate goal of early assessment is the timely delivery of educational information to populations at high risk for developing caries in order to prevent the need for later surgical intervention.

9. **RECOMMENDATION FIVE:** CARIES RISK ASSESSMENT

9.1. The most common indications are discussed.

9.2. Caries risk assessment is the determination of the likelihood of the incidence of caries (i.e. the number of new cavitated or incipient lesions) during a certain time period or the likelihood that there will be a change in the size or activity of lesions already present.

9.3. With the ability to detect caries in its earliest stages (i.e. white spot lesions), healthcare providers can help prevent cavitation.

9.4. Caries risk assessment models currently involve a combination of factors including diet, fluoride exposure, a susceptible host, and microflora that interplay with a variety of social, cultural, and behavioural factors.

9.5. Risk assessment tools can aid in the identification of reliable predictors and allow dental practitioners, physicians, and other non-dental health care providers to become more actively involved in identifying and referring high-risk children. **Appendix 2** incorporate available evidence into practical tools to

assist general physicians, and pediatricians to in assessing levels of risk for caries development in infants, children, and adolescents.

9.6. Circling those conditions that apply to a specific patient helps the health care worker and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor (e.g. frequent exposure to sugar containing snacks or beverages, visible cavities) in determining overall risk. The Overall assessment of the child's dental caries risk is checked below as High or Low.

10. RECOMMENDATION SIX: PERINATAL PERIOD AND ANTICIPATORY GUIDANCE

10.1. The perinatal period is defined as the period around the time of birth, beginning with the completion of the 20th to 28th week of gestation and ending one to four weeks after birth. The perinatal period plays a crucial role for the well-being of pregnant women.

10.2. Identifying mothers with high levels of dental caries and poor oral health and educating them on the importance of their own oral health and the future health of their unborn child can help change their trajectory of oral health. Timely delivery of educational information and preventive therapies to these parents may reduce the incidence of ECC, prevent the need for dental rehabilitation, and improve the oral health of their children. Physicians, nurses, and other health care professionals are far more likely to see expectant or new mothers and their infants than are dentists. Therefore, it is essential that these

providers be aware of oral anomalies and associated risk factors of dental caries in order to make appropriate decisions regarding timely and effective interventions for pregnant women and facilitate the establishment of a dental home for the child.

10.3. Anticipatory guidance is the process of providing practical, developmentally appropriate information about children's health to prepare parents for the significant physical, emotional and psychological milestones.

10.4. Anticipatory guidance to reduce the risk of dental caries should include:

10.4.1. Counselling regarding brushing of child's teeth twice daily with the appropriate amount of fluoridated toothpaste.

10.4.2. Diet analysis.

10.4.3. Counselling to reduce the consumption of sugar containing beverages.

11. RECOMMENDATION SEVEN: RECOMMENDATIONS FOR PERINATAL AND INFANT ORAL HEALTH

11.1. Oral Health Care of pregnant and lactating.

11.1.1. Diet Counselling:

a. Adequate quality and quantity of nutrients for the mother-to-be and the unborn child. Information regarding the caries process and food cravings that may increase the mother's caries risk.

b. Cariogenicity of certain foods and beverages, role of frequency of consumption of these substances, and the demineralization/remineralisation process.

c. Continued breast-feeding along with complementary foods for a period of one year or longer. The transfer of drugs and therapeutics into breastmilk should be considered, especially in infants younger than six months of age.

11.1.2. Comprehensive oral examination:

a. Referral to dental clinic for a comprehensive oral examination and treatment during pregnancy.

11.1.3. Professional oral health care:

a. Routine professional dental care for the parent can help optimize oral health. Removal of active caries, with subsequent restoration of remaining tooth structure, in the parents suppresses the MS reservoir and minimizes the transfer of MS to the infant, thereby decreasing the infant's risk of developing ECC.

11.1.4. Oral hygiene:

a. Brushing with fluoridated toothpaste and flossing by the parent are important to help dislodge food and reduce bacterial plaque levels.

11.1.5. Fluoride:

a. Using a fluoridated toothpaste and rinsing with an alcohol-free, over-the-counter mouth rinse containing 0.05 percent sodium fluoride once a day or 0.02 percent sodium fluoride rinse twice a day have been suggested to help reduce plaque levels and promote enamel remineralisation.

11.1.6. Xylitol chewing gum:

a. Evidence suggests that the use of xylitol chewing gum (at least two to three times a day by the mother) has a significant impact on mother-child transmission of MS and decreasing the child's caries rate.

11.2. Oral healthcare for the infant/children.

11.2.1. Oral health risk assessment:

a. Every infant should receive an oral health risk assessment from his/her primary health care provider or qualified health care professional by six (6) months of age.

11.2.2. Establishment of a dental home:

a. Establishment of a dental home begins no later than twelve (12) months of age and includes referral to dental specialists when appropriate.

11.2.3. Teething:

a. Teething can lead to intermittent localized discomfort in the area of erupting primary teeth, irritability, and excessive salivation; however, many children have no apparent difficulties. Treatment of symptoms includes oral analgesics and chilled rings for the child to gum.

b. Use of topical anesthetics, including over-the-counter teething gels, to relieve discomfort are discouraged due to potential toxicity of these products in infants.

11.2.4. Oral hygiene:

a. Oral hygiene measures should be implemented no later than the time of eruption of the first primary tooth. Tooth-brushing should be performed for children by a parent twice daily, using a soft toothbrush of age-appropriate size and the correct amount of fluoridated toothpaste.

11.2.5. Diet:

a. Human breast milk is uniquely superior in providing the best possible nutrition to infants and has not been epidemiologically associated with caries. However frequent night time bottle feeding with milk and ad libitum breast-feeding are associated with, but not consistently implicated in, ECC. Breastfeeding greater than seven times daily after twelve (12) months of age is associated with increased risk for ECC. Night time bottle feeding with juice, repeated use of a sippy or no-spill cup, and frequent in between meal consumption of sugar-containing snacks or drinks (e.g., juice, formula, soda) increase the risk of caries. The American Academy of Pediatrics has recommended children one through six years of age consume no more than four to six ounces of fruit juice per day,

from a cup (i.e., not a bottle or covered cup) and as part of a meal or snack.

11.2.6. Fluoride:

a. The use of fluoride for the prevention and control of caries is documented to be both safe and effective. The correct amount of fluoridated toothpaste should be used twice daily. No more than a smear or rice-sized amount of fluoridate toothpaste should be used for children under age three; no more than a pea-sized amount should be used for children ages three to six.

11.2.7. Injury prevention:

a. Practitioners should provide age-appropriate injury prevention counselling for orofacial trauma. Initially, discussions would include play objects, pacifiers, car seats, and electric cords.

11.2.8. Non-nutritive habits:

a. Non-nutritive oral habits (e.g., digit or pacifier sucking, bruxism, abnormal tongue thrust) may apply forces to teeth and dentoalveolar structures. It is important to discuss the need for early sucking and the need to wean infants from these habits before the age of three (3) years old.

12. **RECOMMENDATION EIGHT:** CONCLUSION

12.1. Oral health is an integral part of the overall health and well-being of children. A Pediatrician who is familiar with the science of dental caries, capable of

assessing caries risk, comfortable with applying various strategies of prevention and intervention and connected to dental resources can contribute considerably to the health of his/her patients.

12.2. Pediatricians see children from a young age and on a more frequent basis than general or pediatric dentists and therefore, they are in a perfect position to evaluate the risk of dental decay, start prevention and refer children who need dental treatment. However, there are several barriers to educating pediatricians and medical practitioners including issues related to professional boundaries between dentistry and medicine and time limitations.

12.3. Incorporating children's oral health into DHA medical residency programs and through continued medical education courses and better, open communication between medical and dental professional can minimize these barriers.

12.4. Pediatric dental oral health program is accepted to be included in DHA medical residency curriculum. This guideline is the core reference for building the curriculum for medical residents in DHA with pre and post-assessment of knowledge which has commenced in 2018.

KEY PERFORMANCE INDICATORS (KPIs)

1. Patient Happiness: Overall Assessment	
DHA Pillar	Patient Happiness
Indicator Name	Overall Assessment
Measure Type	Outcome
Data Source	Survey data
Measure Description	People who had a very favorable overall assessment of the facility during measurement period
Measure Denominator	All survey respondents who meet inclusion criteria
Measure Numerator	Survey respondent whose overall assessment of the facility was very high - patients with the highest possible score (scale has 2-7 options) or the two highest options (scale has 8+ options)
Measure Inclusion Criteria	Total number of valid responses to surveys that ask a patient to give their overall assessment of a facility
Measure Exclusion Criteria	None
Source	DHA
International Benchmark	None: Dubai facility surveys are not sufficiently uniform to allow benchmarking
Higher is Better	Yes
Risk Adjust This Measure	No

2. Patient Happiness: Recommendation to Others	
DHA Pillar	Patient Happiness
Indicator Name	Recommendation to Others
Measure Type	Outcome
Data Source	Survey data
Measure Description	Percentage of patients who were very likely to recommend the facility to other people during measurement period
Measure Denominator	All survey respondents who meet inclusion criteria
Measure Numerator	Survey respondent whose recommendation was very high - patients with the highest possible score (scale has 2-7 options) or the two highest options (scale has 8+ options)
Measure Inclusion Criteria	Total number of valid responses to surveys that ask whether the patient would recommend the facility to others
Measure Exclusion Criteria	None
Source	DHA
International Benchmark	None: Dubai facility surveys are not sufficiently uniform to allow benchmarking
Higher is Better	Yes
Risk Adjust This Measure	No

3. Patient Happiness: Doctors Made Sure Patient Understood All Information	
DHA Pillar	Patient Happiness
Indicator Name	Doctors Made Sure Patient Understood All Information
Measure Type	Outcome
Data Source	Survey data
Measure Description	Percentage of patients who answered favorably ('yes') that doctors made sure he/she understood all information
Measure Denominator	All survey respondents who met inclusion criteria
Measure Numerator	Survey respondent indicated 'yes,' doctors made sure that the patient understood all information
Measure Inclusion Criteria	Valid response to the survey question ('yes' or 'no')
Measure Exclusion Criteria	None
Source	DHA
International Benchmark	None: Dubai facility surveys are not sufficiently uniform to allow benchmarking
Higher is Better	Yes
Risk Adjust This Measure	No

4. Patient Safety: Rate of Medication Error	
DHA Pillar	Patient Safety
Indicator Name	Rate of Medication Error
Measure Type	Outcome
Data Source	Internal facility records, reports, or survey data
Measure Description	Rate of prescriptions per 100,000 with a dispensing error during measurement period
Measure Denominator	Number of medication prescriptions during measurement period
Measure Numerator	Number of prescriptions in which a medication error occurs (e.g. dispensing error, prescribing error, administering and preparing error, patient compliance error, vaccine error, administering a medicine for a known allergy patient, dose-related adverse drug reaction)
Measure Inclusion Criteria	All filled prescriptions
Measure Exclusion Criteria	Unsafe condition and near miss incident, adverse drug reactions
Source	TEC required measures http://apps.who.int/iris/bitstream/10665/252274/1/9789241511643-eng.pdf
International Benchmark	2.28 Per 100,000 (in the U.S.) Source: https://www.nationwidechildrens.org/newsroom/news-releases/2017/07/study-finds-rate-of-medication-errors-resulting-in-serious-medical-outcomes-rising . One medication error occurs for every five doses given in US hospitals and 1-2% of patients admitted to US hospitals are harmed by medication errors. Source: http://stateclaims.ie/wp-content/uploads/2017/11/Medication-Incidents-Report-2016.pdf
Higher is Better	No
Risk Adjust This Measure	No

5. Patient Safety: Rate of Medical Error	
DHA Pillar	Patient Safety
Indicator Name	Rate of Medical Error
Measure Type	Outcome
Data Source	Internal facility records, reports, or survey data
Measure Description	Rate of medical errors (errors in diagnosis, medication, surgery, equipment use, lab findings interpretation) per 100,000 patients in measurement period
Measure Denominator	All qualifying patients in measurement period
Measure Numerator	Medical errors as defined through proven reports (e-medical systems) during measurement period
Measure Inclusion Criteria	All patients with at least one medical encounter in measurement year
Measure Exclusion Criteria	None
Source	TEC required measures http://apps.who.int/iris/bitstream/10665/252274/1/9789241511643-eng.pdf
International Benchmark	To be discussed with DHA
Higher is Better	No
Risk Adjust This Measure	No

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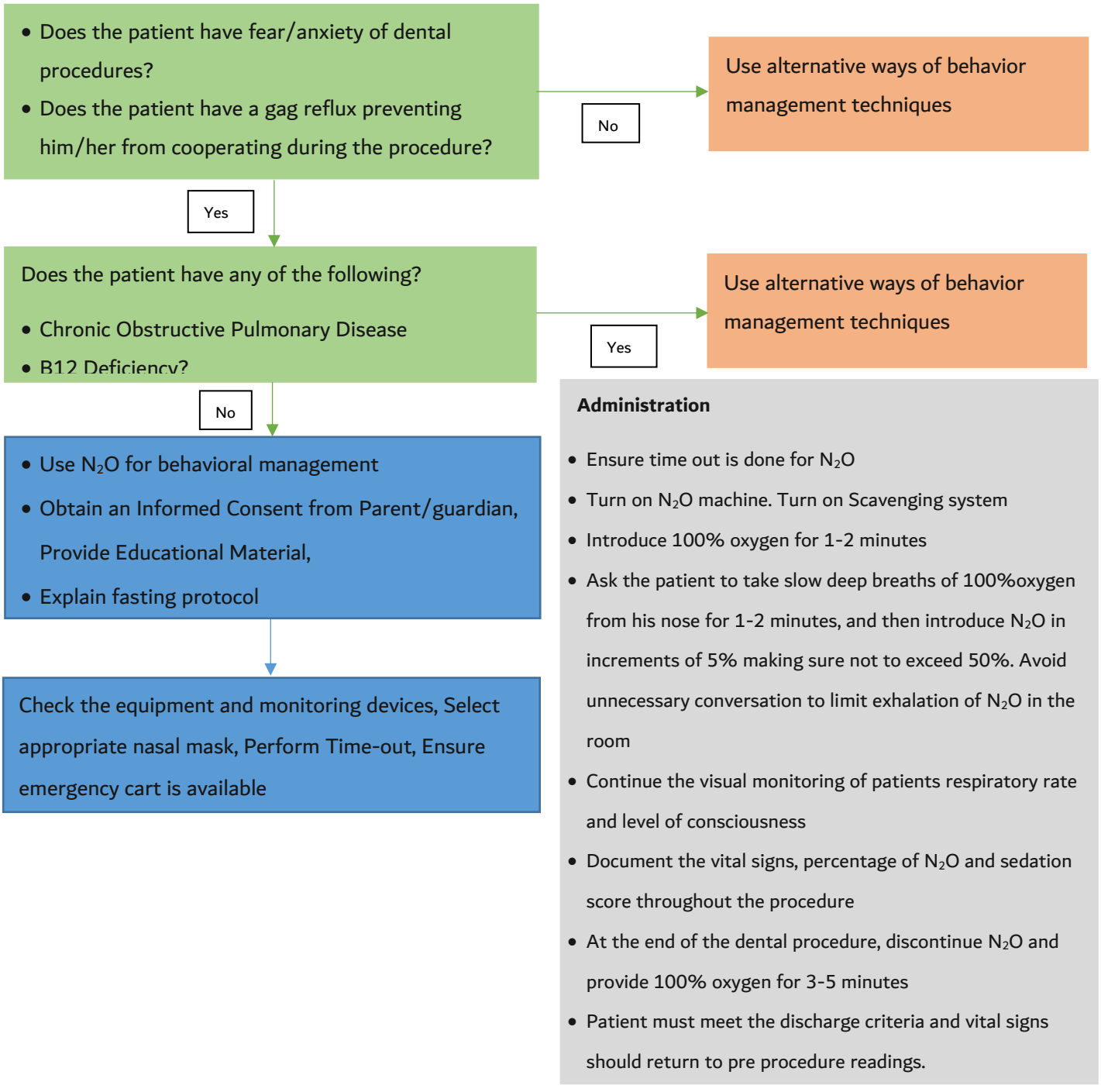
APPENDICES:

APPENDIX 1: CLINICAL PATHWAY IN THE DECISION MAKING PROCESS FOR THE USE OF N_2O ADMINISTRATION



APPENDIX 2: CARIES- RISK ASSESSMENT FORM FOR 0-3 YEARS OLDS

Caries- risk Assessment Form for 0-3 Years Olds for Physicians and Other Non-Dental Professionals		
Factors	**High Risk**	**Low Risk**
Biological		
Mother/primary caregiver has active cavities	Yes	
Parent/caregiver has low socioeconomic status	Yes	
Child has >3 between meal sugar-containing snacks or beverages per day	Yes	
Child is put to bed with a bottle containing natural or added sugar	Yes	
Child has special health care needs	Yes	
Child is a recent immigrant	Yes	
Protective		
Child receives optimally-fluoridated drinking water or fluoride supplements		Yes
Child has teeth brushed daily with fluoridated toothpaste		Yes
Child receives topical fluoride from health professional		Yes
Child has dental home/regular dental care		Yes
Clinical Findings		
Child has white spot lesions or enamel defects	Yes	
Child has visible cavities or fillings	Yes	
Child has plaque on teeth	Yes	
Overall assessment of the child's dental caries risk:	**High ☐**	**Low ☐**