

Dental Management of Children with Special Health Care Needs (SHCN) – A Review

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ABSTRACT

Oral health of children with special health care needs has been one of grey areas in the field of pediatric dentistry. There has been a general agreement that disabled population has higher prevalence of dental caries, poor oral hygiene, and compromised gingival and periodontal health than the otherwise healthy population. In the past the emphasis has been made on providing basic dental care but in the recent years, the dental professionals and parental groups have shown increased concerns in providing complete oral health care to children with special health care needs. This is as a result of realization that individuals with disability, whether developmental or acquired, are entitled to opportunity to achieve appropriate rehabilitation, to enable them realize their maximum level of functioning. Children with special health care needs present unique challenges for both pediatric and general dentists in order to provide them access to the oral health care system by establishing a treatment plan for those with unique medical, behavioral and dental needs and maintaining oral health over the lifetime. The purpose of this article is to describe the characteristics of some common developmental disabilities and medically compromised states and the challenges these issues present to the oral healthcare practitioner.

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1. INTRODUCTION

Every child is unique. Children are emotionally and physically immature and cannot independently meet their social and cultural exceptions. The AAPD defines Special Health Care Needs (SHCN) as “any physical, developmental, mental, sensory, behavioural, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs. The condition may be congenital, developmental, or acquired through disease, trauma, or environmental cause and may impose limitations in performing daily self-maintenance activities or substantial limitations in a major life activity. Health care for individuals with special needs requires specialized knowledge acquired by additional training, as well as increased awareness, attention, adaptation, and accommodative measures beyond what are considered routine [1].

With half of the world’s population under 15 years of age, the number of adolescents and youth with disabilities particularly in developing countries is significantly higher and is on the rise. According to the US Census Bureau, approximately 36.3 million Americans have a disability; with about two-thirds of these individuals having a severe disability [2]. The proportion of children in the US with Special Health Care Needs (SHCN) is estimated to be 18 percent, approximately 12.5 million [3]. It is estimated that 6–10% of children in India are

born disabled and that possibly one-third of the total disabled population is comprised of children. Children and adolescents with SHCN are almost twice as likely as their peers without SHCN to have unmet oral healthcare needs across all income levels [4].

Oral health is an inseparable part of general health and well-being. Individuals with SHCN may be at an increased risk for oral diseases throughout their life time either because of their actual disability or for other medical, economic or social reasons, or even because their parents find it very difficult to carry out proper daily oral hygiene (e.g. cariogenic effect of medicines with high sugar content, excessive tooth grinding with self-mutilating behaviours) [5-7]. Patients with compromised immunity (e.g. leukaemia or other malignancies, human immunodeficiency virus) or cardiac conditions associated with endocarditis may be especially vulnerable to the effects of oral diseases [8]. Patients with mental, developmental, or physical disabilities who do not have the ability to understand, assume responsibility for, or cooperate with preventive oral health practices are susceptible as well [9].

Children with disabilities may present challenges that require special preparation before the dentist and office staff can provide acceptable care. In addition, parent’s anxiety concerning the problems associated with a child’s disabilities frequently delays dental care that cause’s significant oral disease to develop. Also some dentists feel uncomfortable providing treatment for children with disabilities, which results in a

Table 1. Classification of special health care needs children

Frank and winter (1974)	According to Agerholm [10]	According to Nowak (1976)
<ul style="list-style-type: none"> • Blind or partially sighted • Deaf and partially deaf • Educationally subnormal • Epileptic • Maladjusted • Physically handicapped • Defective of speech • Senile 	<ul style="list-style-type: none"> • Intrinsic category The handicapped condition cannot be eliminated/ separated/improved significantly in the child. e.g. cerebral palsy, mental retardation • Extrinsic category The handicapped condition may be made better with strategic meticulous care. Social deprivation is an example. 	<ul style="list-style-type: none"> • Physically handicapped-polio • Mentally handicapped-retardation • Congenital – cleft lip and palate • Convulsive- epilepsy • Communication-deafness • Systemic- haemophilia • Metabolic- juvenile diabetes • Osseous disorder- rickets • Malignant disorder-leukaemia

loss of greatly needed services. This paper discusses some of the disabilities and medical conditions of children that a dentist may encounter in practice. If a dentist becomes familiar with the special needs of a child with disabilities and with the parents' concerns, the dental management of the child can be quite gratifying.

2. CEREBRAL PALSY (CP)

2.1 Introduction

Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication, behaviour, by epilepsy and by secondary musculoskeletal problems [11].

2.2 Classification of Cerebral Palsy [12-14]

- 1) Spastic cerebral palsy = as much as 70% of children inflicted by CP fall under this type. The muscle involved is hyper mobile and undergoes exaggerated contraction.
- 2) Dyskinetic (athetoid cerebral palsy) = only 15% cases of cerebral palsy are of dyskinetic type. Characteristically the involuntary movements are twisty or writing (athetosis) or quick jerky (choreoathetosis). There are abnormal patterns of chewing and swallowing and also of speech.
- 3) Ataxic cerebral palsy = 5% of cases of are of this type. The involved muscles are unable to contract properly thus resulting in partial performance of voluntary movements. The symptoms involve staggered gait and poor kinesthesia.
- 4) Mixed Cerebral Palsy = This kind of cerebral palsy shows features of more than one subtype of cerebral palsy. It is seen in not more than approximately 10% cases.
- 5) Hypotonic Cerebral Palsy = In one of these less common types of cerebral palsy there is flaccidity of involved muscles with their reduced tonicity. Thus the muscles improperly respond to stimulation.
- 6) Rigid cerebral palsy – it is another less common type of CP. The affected muscle groups are in a persistent state of contraction without any stimulation.

2.3 Oral Manifestation

1. Prevalence rate of malocclusion has been reported between 59 and 92%, with vast majority of malocclusion classified as Angles Class II with increased over-jet and overbite, unilateral cross-bite and open bite associated with abnormal oral habits is twice more common [15-18]. This is because of following reasons:
 - a. Uncoordinated movement of jaws lips and tongue.
 - b. Mouth open posture with postural tongue thrust and mouth breathing.
2. Rodrigues CAM et al. [19] found that the prevalence of dental trauma was 36.3%; enamel fracture was the most common trauma (89.1%). Jalihal S et al. [20] found that there was highest prevalence of TDI in cerebral palsy patients with hemiplegia (40.6%). There are other studies that found the prevalence to be lesser (9.2-20%). Fracture of enamel and dentine was the most common type of injuries.
3. A high prevalence of bruxism in individuals who have CP has been reported in many studies. Souza VAF et al. [21] exhibiting involuntary movements, the male gender and gastro-oesophageal reflux are factors associated with bruxism in children with developmental disabilities.
4. The prevalence of periodontal disease is higher. This is because of the following reasons:
 - a. Poor manual dexterity of the child to perform good oral hygiene measures
 - b. Anti-convulsant medication induced gingival enlargement
5. Ferreira de Camargo et al. [22] found that the incidence of caries among children and adolescents who have CP is high but Quintela M et al. [23] concluded that in both dentitions, individuals with cerebral palsy have less chance of having caries than the subjects in the comparison groups. Dietary consistency and oro-motor function were statistically significant influence on the DMF index.
6. Dental erosion is common in CP patients, and dentists should be alert towards early signs of erosion in cerebral palsy patients and provide appropriate preventive therapy. Abanto et al. [24] concluded that erosive tooth wear (ETW) in CP children is associated to frequent consumption of soft drinks, powdered juices, and reported gastro-oesophageal reflux. Most of the

affected teeth observed in the CP group were upper molars (54%), lower molars (58%) and upper incisors (54%).

7. The sequence of eruption in children with CP was almost similar to the normal. With the exception of the second premolar and the second molar which shows delayed eruption (Moslemi M et al. [25]).
8. X. Lin et al. [26] found that a high prevalence of developmental enamel defects was found among the children with CP (Enamel hypoplasia was found in (25.9%) of the CP children, opacity alone was found in (3.7%) of the CP children, and mixed defects (opacity and hypoplasia) was found in (3.0%) of the CP children).

2.4 Dental Management

The treatment consideration involves three points.

1. Intellectual maturity and cooperative ability: Based on this assessment, children are classified as educable, trainable and non trainable.
2. Postural compliance in the dental chair: The manifestation of enhanced muscular rigidity, hyper contractility, uncoordinated movements and ataxic gait may compromise the compliance of child to lie down on a dental chair.
3. Preventive care: Includes good oral hygiene practices, training and awareness of oral hygiene practices to the caretaker, fluoride and sealant application and periodic review are emphasised.

Additional considerations-

- A. A patient using a wheelchair should be considered to be treated in the wheelchair itself. Even if there is a need or decision to transfer the patient the mode of transferring the patient

must be asked for. The two person lift is to be incorporate when the patient doesn't have any preference.

- B. The patient must be stabilised and maintained in the midline of the dental chair with both arms and both legs as close to the midline as comfortable. The upper and lower limbs of the patient should not be forced into unnatural position.
- C. Patient preference should be of utmost importance. In order to minimise severe gag reflex that may occur in children with cerebral palsy a choice of two modified radiographic technique is available: one is the 45 degree oblique head plate and other is the reverse bite wing (buccal technique).
- D. It must be on the operator to work as efficiently as possible and minimise the fatigue of the muscles involved.

2.5 Home Dental Care for Cerebral Palsy Patients

- A well lit location must be chosen so that one can properly look into one's mouth.
- Whatever be the manner in which a parent helps the child to brush his teeth the head of the child must always be supported
- For children up to 3 years of age parents must only use baby tooth cleanser. This helps to avoid the discoloration due to fluorosis in adult teeth.
- Almost all of the medications prescribed to children contain sucrose. Thus a child on oral medications must get their teeth cleansed after each medication.
- Tuna et al. [27] concluded that Daily application of 10% w/v CPP-ACP paste effectively changes saliva buffering capacity and plaque pH, thus promoting caries prevention in the primary and mixed dentition of CP children.

Table 2. Etiology

Prenatal	Perinatal	Postnatal
Hypoxia	Asphyxia	Cerebral infarction
Genetic disorders	Premature birth (<32 weeks)	Hyper-bilirubinemia
Multiple gestation	Blood incompatibility	respiratory distress syndrome
Teratogenic exposure	Infection	Meningitis
Maternal fever		Intra-ventricular haemorrhage

3. INTELLECTUAL DISABILITY (ID)

The diagnosis of intellectual disability (previously referred to as “mental retardation”), as defined by the American Academy of Intellectual and Developmental Disabilities, requires sub average functioning (below 70-75 on standardized measures) in 2 or more of the following adaptive skill areas: communication; self-help; home living; social and interpersonal skills; use of community resources; self-direction; health and safety “functional academics,” leisure and work [28]. The overall prevalence of ID is 1% of the population [29].

3.1 Classification

Based on levels of cognitive functioning:

1. Mild: IQ=55-70; 85% of ID, functions at the sixth grade level, may live independently or in supervised setting; can successfully support self, usually no etiology found.
2. Moderate: IQ=40-55; 10% of ID; second-grade academic level, adequate self-help care, may need assistance, lives at home or in group home, unskilled or semiskilled work with supervision.
3. Severe: IQ=25-40, 3% to 4%, preschool academic abilities-sorting and matching, may be nonverbal or minimally verbal, may use communication device, poor fine motor skills and requires supervision for activities of daily living (ADLs), lives with family or in group homes.
4. Profound: IQ<25= 1% to 2%, may not ambulate; requires close supervision and assistance with ADLs, may be totally dependent for hygiene.

Table 3. Etiology

Prenatal	Natal	Postnatal
Inherited disorders	Haemorrhage	Cerebral Trauma
Thyroid disorders	Hypoxia	Poisoning
Kernicterus	Hypoglycaemia	Brain infections

3.2 Oral Manifestation

1. Advanced case of baby bottle tooth decay prescription- medication induced dental decay.

2. Altered salivary flow and tooth decay “placating” tooth decay, malocclusion, fractured and non-vital teeth, soft tissue complication and bruxism rates of dental decay.
3. Major loss of tooth structure leading to eventual extraction can affect developing speech pattern.
4. Unmonitored food consumption/ loss of space for the permanent dentition causing significant malocclusion, abnormal jaw development, marked alternation in mastication, poor aesthetics.
5. Poor dental hygiene dental plaque gingivitis, calculus in early ages , intense halitosis due to food remnants in teeth and mucosa , and cariogenic and soft diet.

Modric, VE et al. [30] concluded that Children with intellectual disabilities have more developmental defects of enamel than children in the control group. Enamel defects increase caries risk.

Yuki O et al. [31] concluded that patients with ID harbouring both *S. mutans* and *S. sobrinus* have a significantly higher incidence of dental caries than those with *S. mutans* alone.

3.3 Dental Management

Intellectually disabled children show restlessness and overly uncertain emotional behaviour. These children may also have a shorter attention span. Delayed or premature eruption or exfoliation may be present. There may be an increased susceptibility to caries and periodontal diseases in these children due to poor oral hygiene.

It is important to reduce the anxiety of the patient and establish a good dentist parent patient understanding in order to adequately deliver paediatric oral therapy to a child.

These two core objectives maybe attained by the following:

- 1) **Familiarisation (Desensitisation)** – The apprehensive child patient needs to be desensitised to reduce his anxiety and fear of things around him that maybe unknown to him by familiarising him with the environment of the dental office.
- 2) **Effective communication** –It is important to make the child understand the proceedings by uncomplicated and simple verbal interaction. These are effectively

- used in Educable Mentally Retarded (EMR) and Trainable Mentally Retarded (TMR).
- 3) **Active Listening** - This helps to easily and effectively assess the communication skills and attentiveness of the child patient.
 - 4) **Short appointment time** – The attention span of children is small thus short appointments are predictably uneventful.
 - 5) **Structuring and schedule** – The treatment must be provided at times when the dentist and the operator are least fatigued likewise at the starting of the day.
 - 6) **Positive Reinforcement** – The presentation of behaviour by the child that is desirable throughout the procedure must be positively reinforced by a social or material reward.

3.4 Autism Spectrum Disorders (ASDs)

ASDs consist of five subtypes, which include autistic disorder; Asperger syndrome; Rett's syndrome; childhood disintegrative disorder (CDD) and pervasive developmental disorder—not otherwise specified, as defined by the DSM-IV-TR [32] Recent studies estimate the prevalence of all ASDs to be in the range of 6.5 to 6.6/1,000 [33].

ASDs are lifelong neurobiological disorders manifested by a wide range of abilities and outcomes. Despite the broad range of severity, all ASDs share common deficits in 3 areas of functioning:

1. Language; (Only two thirds of autistic children achieve some functional speech)
2. Social skills; (little or no attachment to their parents)
3. Restricted, repetitive, and stereotyped patterns of behaviour, interests, and activities; (self-sufficient, introvert, want to be alone and frequently relate well to objects)

3.5 Dental Findings

- 1) Higher susceptibility to caries – this may be due to cariogenic foods, poor tongue control and inability to properly brush and floss. El Khatib A et al. [34] found that the oral condition of children with ASD might increase the risk of developing dental diseases. Their behaviour and life factors may complicate provision of services and limit access to dental care.

- 2) Gingivitis and poor oral hygiene Due to heavy accumulation of plaque and influences of hormone are reasons of dental concern. R Demattei et al. [35] found that Children with an ASD displayed the following percentages for clinically visible conditions: plaque (85%), gingivitis (62%), and caries (21%).
- 3) Damaging Oral Habits – tongue thrusting, bruxism, pica lip and cheek biting.

3.6 Dental Management

- 1) The first appointment should be short and positive. The parents and child must be offered a tour of the dental office where the child may be allowed to bring items that comfort him like a toy.
- 2) The child must always be dealt with or at least approached in a non-threatening manner.
- 3) Autistic infants show an intense desire to maintain a consistent environment. Thus parental suggestions are of utmost importance.
- 4) It must always be kept in mind that even the smallest changes in the environment may trigger extreme anxiety in the child.
- 5) When autistic children are held they show extreme resistance to the same and react inappropriately to fearful situations. They are extremely sensitive to loud noises and movements that maybe felt.
- 6) The child must be allowed to sit on the dental chair in order to properly familiarise with the dental operatory environment.
- 7) The dentist must talk calmly and in short phrases. The autistic children are prone to tantrums and aggressive behaviour. The light must be kept out of the eyes
- 8) The key to all kinds of behaviour modification techniques incorporated to encourage desirable behaviour lies in adequate incorporation of positive reinforcement.
- 9) Moderate pressure such as wrapping a child with a papoose board can be used to calm autistic children.
- 10) Despite all such measures some children must still need general anaesthesia or sedation so that proper paediatric dental therapy can be delivered.

4. VISUAL IMPAIRMENT

A visually impaired child is the one whose visual activity is not more than 20/200 even along with

correcting lenses. Blindness though is a relative term.

Table 4. Etiology

Prenatal causes	Postnatal causes
Atrophy of the eye	Hypertension
Microphthalmia	Premature polycythaemia
Syphilis and rubella	Diabetes mellitus
Cataracts	Glaucoma

4.1 Communication

- 1) The dental care of the patient should be limited to one dentist as much as possible.
- 2) Braille dental pamphlets and audio tapes can be used to inform and decrease chair time.
- 3) The atmosphere in the dental operatory should be relaxing. It must be always kept in mind that the patient cannot see the dentists' smile. The distractions must be as minimum as possible and unexpected loud noises must be avoided.
- 4) The patient must not be startled by a sudden touch or voice. The conversation must be simple and easy to understand.
- 5) The print material used must be of larger size with 16 – 18 or larger point size.
- 6) Moving from one place to another or leaving the room must be indicated priory.

4.2 Dental Findings

1. Bimstein E et al. [36] concluded that children and adolescents with or without hearing or visual impairment develop similar dental caries prevalence. Oral hygiene and resulting gingival inflammation are a challenge for the visually impaired and, to a lesser degree, the auditory impaired.
2. Shetty V et al. [37] 6-n-propylthiouracil (PROP) sensitivity test can be a useful tool in determining genetic taste sensitivity levels amongst the visually impaired children and thus used as a screening tool in those children who are at a high risk of developing dental caries.
3. Bhat N et al. [38] found that visually impaired children (32.5%) had significantly higher percentage of teeth fracture than that of sighted children (9.6%).Varghese RK et al. [39] found that an overall prevalence of traumatic injuries was

37.8%. Totally blind subjects (57.1%) had significantly higher percentage of teeth fracture than that of partially sighted (32%) (p=0.01). Females (43.1%) were having significantly higher teeth fracture than males (29.9%)

4. Kadkhoda Z et al. [40] concluded that Blind individuals successfully learned the method of brushing by using their tactile sense, which significantly improved their oral hygiene in terms of Plaque Index (PLI), and Papillary Bleeding Index (PBI).
5. Smutkeeree A et al. [41] concluded that both the horizontal Scrub and modified Bass methods can be effectively reduced plaque index and gingival index in visually impaired students.

4.3 Dental Management

- 1) The degree of impairments must be properly determined (like if the patient can differentiate light and dark)
- 2) A distinction between those children that are visually impaired from birth and those who had vision problems later during their life is important. This helps to focus more on congenitally visually impaired child to explain him the proceedings more didactically and attentively.
- 3) The patient must be asked if he desires any kind of assistance in the operatory. He must always be warned before moving, grabbing or stopping him.
- 4) Sympathising with the patient and referring to his disability as a congenital defect or a curse must be strictly avoided.

5. HEARING IMPAIRMENT

Hard hearing or Hearing disability is a group of conditions in which the patient is partially or completely unable to detect at least some sound frequencies that are normally heard by other people.

5.1 Dental Findings

1. Kumar S et al. [42] concluded that children with hearing impairment have poor oral hygiene and high levels of periodontal disease. This may be due to a lack of communication; hence, appropriate oral health education should be tailored to the needs of these students with the support of their teachers and their parents.

2. Sandeep V et al. [43] concluded that Visual instruction was found to be an effective oral health education tool in Children with hearing impairment (CHI).
3. Pareek S et al. [44] concluded that the program of teacher and parent supervised toothbrushing with fluoride toothpaste can be safely targeted to socially deprived communities and can enable a significant reduction in plaque and gingival scores. Thus, an important principle of oral health education is the active involvement of parents and caregivers.

5.2 Dental Management

- 1) The dental management primarily depends upon assessing the mutual communication skills. Communicating verbally may be less effective or even ineffective. Thus other communication methods like relaxed facial expressions, physical contact and consistent eye contact must be emphasised upon. Champion J et al. [45] concluded that removing masks while talking, reducing background noise and learning to use simple signs may improve communication with hearing-impaired children.
- 2) Positive reinforcement can help to serve as one of the best aids to continuously produce desirable behaviour.
- 3) During explaining the procedure to the patient any sort of loud tone or shout should be avoided. The things that a dentist tells the patient should be spelt and talked about slowly and clearly so that the patient has enough time to understand and interpret by lip reading.
- 4) Amplification of sounds maybe possible by tuning in hearing aids. The noise of the aerator may be distressing to the child if amplified.

Table 5. Etiology

Prenatal factors	<ul style="list-style-type: none"> • Rubella • Influenza • Congenital syphilis • Ototoxic drugs • Heredity(Treacher Collins)
Perinatal factors	<ul style="list-style-type: none"> • Toxaemia late in pregnancy • Erythroblastosis fetalis
Postnatal factors	<ul style="list-style-type: none"> • Mumps • Influenza • Poliomyelitis • Ototoxic Drugs
Genetic	<ul style="list-style-type: none"> • Stickler Syndrome • Waardenburg syndrome • Pierre robin syndrome • Congenital deformities
Diseases	<ul style="list-style-type: none"> • Measles • Mumps • Meningitis • AIDS • Fetal alcohol Syndrome
Medication	<ul style="list-style-type: none"> • Aminoglycosides , diuretics , NSAIDS , macrolide antibiotics • Narcotic pain killers • Extremely heavy hydrocodone

6. CARDIAC ABNORMALITIES

Some of the very common cardiac abnormalities that are seen to occur congenitally are-

- Atrial septal defect(ASD)
- Ventricular Septal Defect(VSD)
- Valvular regurgitation
- Valvular stenosis
- Mitral valve prolapse

Table 6. Auditory impairment and associated communication impairment

Auditory impairment	Associated communication impairment
Slight – sounds of 25 dB are inaudible	Slight verbal deficit
Mild Moderate – sounds of 40 dB are inaudible	Frequent difficulty in normal speech Mildly affected language skills
Marked – sounds of 55dB are inaudible	Frequent difficulty in normal speech Difficulty in understanding words even with hearing aids.
Severe – sounds of 70 dB are inaudible	Only shout or amplified speech at a distance of up to 1 foot from ear can be understood.
Extreme – sounds of 90 dB are inaudible	Speech isn't understood even when amplified. Child doesn't rely on hearing for communication

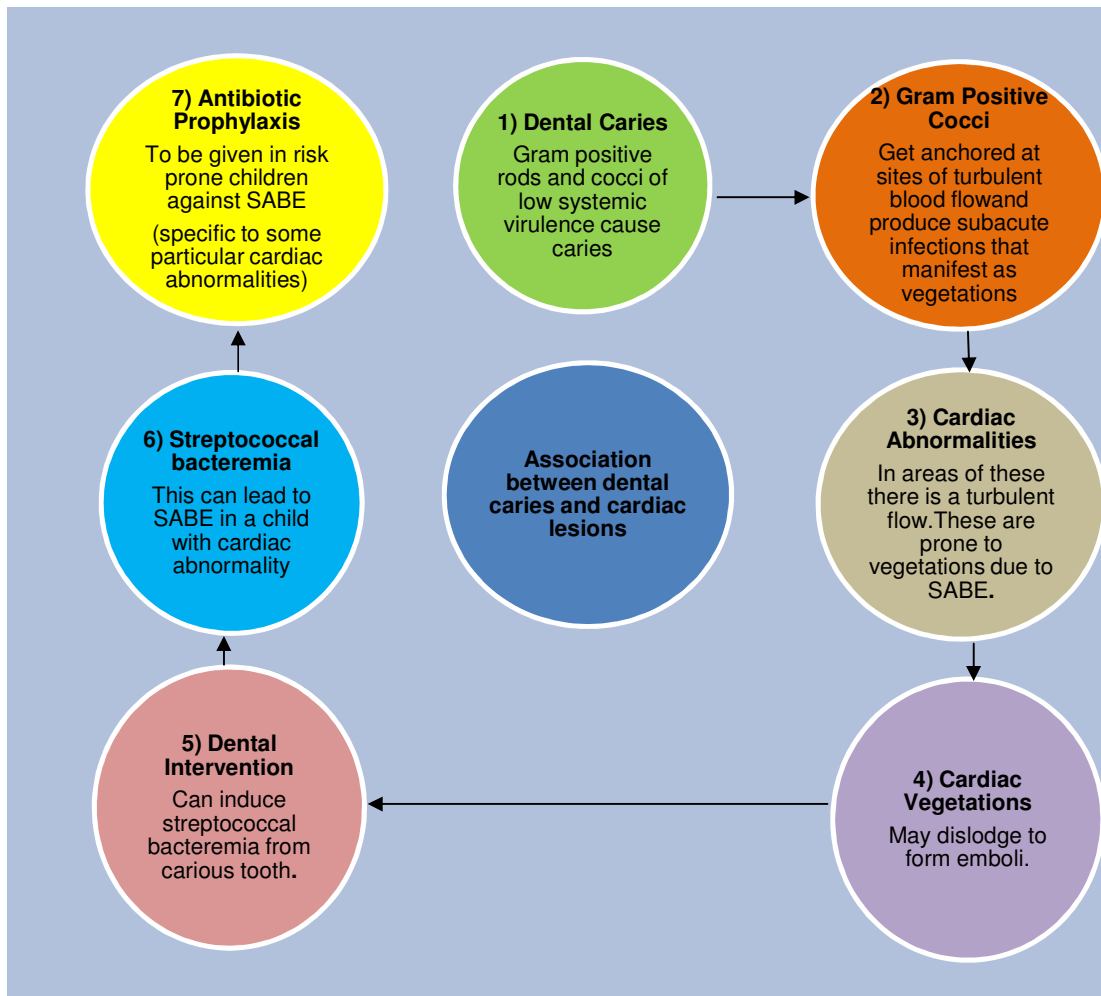


Fig. 1. Association between dental caries and Sabe

6.1 Oral Manifestation

- 1) There is a lack of circulation in the extremities due to which venous congestion may be seen in the soft tissues of the oral cavity.
- 2) The tongue and gingiva may be enlarged along with bluish discoloration.
- 3) The milestones may be delayed. Both exfoliation of deciduous and eruption of permanent teeth is delayed.
- 4) There is an increased susceptibility to dental caries and the teeth may also be discoloured and hypo calcified.

6.2 Antibiotic Prophylaxis

According to new guidelines of AHA, antibiotics before dental procedures are only recommended

for patients with the highest risk of IE, those who have:

1. A prosthetic heart valve or who have had a heart valve repaired with prosthetic material.
2. A history of endocarditis.
3. A heart transplant with abnormal heart valve function
4. Certain congenital heart defects including:
 - A. Cyanotic congenital heart disease (birth defects with oxygen levels lower than normal), that has not been fully repaired, including children who have had a surgical shunts and conduits.
 - B. A congenital heart defect that's been completely repaired with prosthetic

- material or a device for the first six months after the repair procedure.
- C. Repaired congenital heart disease with residual defects, such as persisting leaks or abnormal flow at or adjacent to a prosthetic patch or prosthetic device.

According to the guidelines of the American Heart Association, individuals who are at a risk to develop IE following an invasive dental procedure still benefit from antibiotic prophylaxis. In contrast, the guidelines of the National Institute for Health and Clinical Excellence in England and Wales have recommended that prophylactic antibiotic treatment should no longer be performed in any at-risk patient. Bacteraemia following daily routines such as eating and tooth brushing may be a greater risk factor for the development of IE than the transient bacteraemia that follows an invasive dental procedure [46] However, a single administration of penicillin derivate 30 to 60 minutes pre-operatively still represents the main prophylactic strategy to prevent bacteraemia.

6.3 Dental Management

1. Parents of cardiac patients at risk usually lack knowledge about endocarditis even after being informed during routine cardiology results. So before initiating care dentist should obtain a through medical and dental history.
2. The primary management goal for the patients with cardiovascular diseases during dental therapy is to ensure that any hemodynamic change produced by dental treatment does not exceed the cardiovascular reserve of the patient.
3. If the dental procedure requires the use of anaesthesia, epinephrine is the common additive in local anaesthesia products. Use of epinephrine in some patients with high blood pressure may result in cardiovascular changes/ including rapid development of high blood pressure, angina, and heart attack.
4. The dental health care provider may consult with patient physician before treatment (which can induced bleeding) to determine whether modification of anticoagulant therapy is indicated. In addition drugs interaction with warfarin and other similar agents are numerous and this must be considered.

5. Most Authors agree that there is no need to alter or stop anticoagulant therapy before minor oral surgery procedures when INR level below 4 [48-49].
6. The pulp therapy is not recommended for the primary teeth with poor prognosis because of high incidence of associated chronic infections. Extraction of such teeth with appropriate fixed space maintainer is preferred.
7. Endodontic therapy in permanent teeth can usually be accompanied successfully if the teeth to be treated are carefully selected and endodontic therapy is adequately performed.

7. BLEEDING DISORDERS

Oral care providers must be aware of the impact of bleeding disorders on the management of dental patients. Bleeding disorders include Hemophilia A and B, von Willebrand's disease and thrombocytopenia purpura.

7.1 Oral Manifestation

- 1) Bleeding disorders may rarely manifest any significant findings on teeth.
- 2) Hypo plastic spots and increased susceptibility to decay may be observed due to poor oral hygiene that too occasionally. Sudhanshu S et al (2010) [51] concluded that dental caries prevalence and treatment needs was high among hemophiic patients indicating need for dental services at the earliest as a preventive measure for these patients.
- 3) Even though ecchymosis maybe seen in oral mucosal tissues and gingival enlargement maybe present that may show bleeding tendency but these require no intervention.

7.2 Dental Treatment Consideration

- 1) It is a primary step that a haematologist be consulted for various haematological investigations and reviews and a consent be availed from a physician about the general fitness of the child.
- 2) Almost all major and minor dental treatments have to be carried out only after infusion of factor 8 before the treatment is started.
- 3) Anti-fibrinolytics are adjunctive therapies for dental management of patients with

bleeding disorders. In children epsilon-aminocaproic acid is given immediately before dental treatment in an initial loading dose of 100 to 200 mg/kg by mouth. Subsequently 50-100mg/kg of it is administered orally every 6 hours for 5-7 days. Dose of tranexamic acid in children is 25 mg/kg immediately before dental treatment and same dose is continued every 8 hours for 5-7 days.

- 4) Nuvvula S et al. [52] concluded that freshly prepared tranexamic acid mouth wash (FTAMW) was found to be an effective alternative to factor replacement therapy (FRT) in controlling gingival haemorrhage in haemophiliacs during dental scaling.

Inflammation is an important factor that needs to be controlled before any procedure is undertaken else it may act as a local factor that may contribute to bleeding in addition to systemic condition. Thus maintenance of oral hygiene is important.

- 5) The values of Prothrombin Time (PT) activated partial thromboplastin time (a-PTT), International Normalised Ratio (INR) obtained from a blood investigation may help to finalise a treatment plan.
- 6) Above all any radical measures taken to control bleeding are less preferred than a conservative treatment method undertaken to control bleeding. E.g. Tranexamic acid mouthwash instead of Factor replacement therapy.

Table 7. Recommended IE prophylaxis during interventions in the oral cavity in children [47]

American Heart Association Guidelines (2007)			British Society for Antimicrobial Therapy Guidelines (2006)	
Situation	Agent	Regimen: single dose 30 to 60 min before procedure	Agent	Regimen
Oral	Amoxicillin	50 mg / kg	Amoxicillin	750 mg (< 5 years of age) 1.5 g (5 to 10 years of age) 3 g (> 10 years of age) 1 h before procedure
Unable to take oral medication	Ampicillin, Cefazolin or Ceftriaxone	50 mg / kg IM or IV	Amoxicillin	250 mg (< 5 years of age) 500 mg (5 to 10 years of age) 1 g (> 10 years of age) IV just before procedure or at induction of Anaesthesia
Allergic to Penicillin	Cephalexin Clindamycin Azithromycin or Clarithromycin	50 mg / kg 20 mg / kg 15 mg / kg	Clindamycin	150 mg (< 5 years of age) 300 mg (5 to 10 years of age) 600 mg (> 10 years of age) 1 h before procedure
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or Ceftriaxone Clindamycin	50 mg / kg IM or IV 20 mg / kg IM or IV	Clindamycin Azithromycin	75 mg (< 5 years of age) 150 mg (5 to 10 years of age) 300 mg (> 10 years of age) IV given over at least 10 min 200 mg (< 5 years of age) 300 mg (5 to 10 years of age) 500 mg (> 10 years of age) Oral suspension for patients that cannot swallow capsules 1 h before procedure

Table 8. Severity and manifestation of haemophilia A [50]

Grade of disease or deficiency	Manifestations
Mild (>70%)	Clotting time is increased
Moderate (30-70%)	Occasionally haemarthrosis and intramuscular hematomas may occur on strenuous physical activity
Severe (5-35%)	Spontaneous haemarthrosis and intramuscular hematomas on slight physical activity
Profound (<5%)	Higher chances of haemarthrosis and intramuscular hematoma.

Table 9. Dental treatment consideration

Parameters	High risk of dental procedures
INR	>1.5
PT	>30 sec
aPTT	>55 sec

It maybe of 4 types:

- 1) Acute Lymphoblastic Leukaemia
- 2) Acute Myeloid Leukaemia
- 3) Chronic Lymphoblastic Leukaemia
- 4) Chronic Myeloid Leukaemia

8. LEUKAEMIA

Leukaemia is a hematologic disorder associated with high number of leucocytes with immature progenitor cells of myeloid and lymphoid system.

In children Acute Lymphoblastic Leukaemia is the commonest type with signs of anaemia, increased susceptibility to infections, and increased bleeding disorders all due to decrease in number of mature blood cells.

Table 10. Intra-procedural amendments in haemophilic patients [52-54]

Treatment modality	Methodology recommended	Significance
Administration of local anaesthesia	If factor replacement is not done PDL and intrapulpal injections are highly useful and recommended. Infiltration anaesthesia does not require prior replacement therapy. 40% factor correction should atleast be administered before block injection.	Anatomically nerves run in close association with blood vessels. Accidental prick of the blood vessel may lead to hematoma.
Pulpal Therapy	Even though pulpal therapy is preferred over extraction but periapical instrumentation must be avoided. Teeth that are non-vital are to be obturated 2-3 mm short of the apex. Restorative procedures can be easily completed on primary dentition with conventional use of wedges, matrices and rubber dams.	The bleeding is drastically reduced
Periodontal therapy	Replacement therapy is not needed in procedures such as supragingival scaling and rubber cup prophylaxis. Depending upon the deficiency of the factor and bleeding anticipated subgingival scaling may require factor replacement.	
Minor surgeries	Electrocauterisation and laser involving methods are safer than conventional use of surgical blade. Exodontia involving primary dentition requires upto 30-40% factor administration. After completion of extraction procedures topical hemostatic agents may help with local hemostasis.	Lasers and cauterisation involve minimum risk of bleeding.
Number of treatment appointments	As minimum as possible, should be reduced to 2; appointments involving consecutive days are highly appropriate.	Infusion of factor 8 shouldn't be repeated if treatment involves 2 consecutive days.
Treatment Mode	Full mouth treatment must be completed in one appointment under general anaesthesia Split mouth or split arch under LA where procedures involving portions of the oral cavity are completed in one single appointment	Reducing number of appointments reduces the no of times Factor 8 is infused. Infusion is expensive and the child is subjected to consequent vein pricks.

Table 11. Oral manifestation

Cause	Oral manifestation
Due to the disease (Leukemic Status)	Pale gingival enlargement with increase in bleeding tendency. This is known as leukemic gingivitis.
Due to the drug (chemotherapeutic medication)	Gingival Texture is lost. Immunosuppression may lead to opportunistic candida infections.

Table 12. Dental treatment consideration

Platelets level	Indication
100,000/mm ³	Most dental procedures.
Atleast 50,000/mm ³	Preventive , restorative treatment , injections
<20,000/mm ³	Prophylactic platelet transfusion prior to any dental treatment.
<10,000/mm ³	Prophylactic platelet transfusions.

Table 13. Management of oral manifestations

Finding	Intervention
Oral Candidiasis	Nystatin mouth washes
Leukemic gingival enlargement	Oral hygiene maintenance to prevent secondary 'local factors' associated with inflammation.
Extreme gingival bleed during brushing	Cleaning of tooth surface with cotton moistened with 0.2% chlorhexidine thrice daily alternating with toothbrushing.

9. CONCLUSION

Children with special health care needs have a significantly higher prevalence of oral diseases because of the lack of oral health knowledge, access to care, and preventive measures such as fluoride supplements and dental sealants of their caregivers. The oral health of children with special health care needs has always been found poor when compared to otherwise healthy children in respect to the status of their dentition, periodontium their treatment needs and dentofacial anomalies. Most children with mild to moderate developmental disabilities can be managed in a dental clinic with minor accommodations. A well versed team of knowledgeable dentists, equal parental involvement in challenging treatment plans, and knowing the level of child's development for routine skills language and attention will always help the patient to better cope up with the treatment. The dental team should plan to promote oral health by providing comprehensive school-based programs (including oral health education to help children develop skills), providing fluoride supplements and sealants, and offering dietary and nutrition counselling. Professionally made videos featuring both children with SHCN and healthy children with a diversity of contents can be valuable in educating

them about oral health. Due to the complications of disability and the cumulative nature of disease, regular training about oral healthcare is more important for children with SHCN than for healthy children.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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