

ORAL HEALTH IN COMPREHENSIVE CLEFT CARE

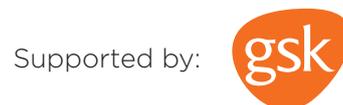
Educational resources for non-oral health professionals



PARTICIPANT HANDOUT

Content developed by the Oral Health in Comprehensive Cleft Care Task Team:
P. Mossey, Muthu MS, S. Yan, M. Campodonico, L. Orenuga
Managing editors: P. Sheeran and R. England

This educational resource was produced as part of a partnership between FDI World Dental Federation and Smile Train, with support from GlaxoSmithKline Consumer Healthcare (GSK CH). No editorial control, apart from ensuring compliance with legal and regulatory considerations/requirements, has been exercised by GSK CH. Funding for the development of this educational resource was provided by GSK CH.



Contents

Oral Health in Comprehensive Cleft Care	3
Introduction	3
Purpose and goal	3
Learning outcomes	3
Day 1	4
Interprofessional collaboration and cleft care	4
Understanding oral anatomy	6
The definition and causes of orofacial clefts	12
Prevention of cleft	14
Oral health conditions commonly associated with cleft	16
Knowledge of dental caries	21
Day 2	26
Identification of white spots, brown spots and caries	26
Common and less common oral diseases	33
Oral health interventions	39
How to carry out a brief oral health intervention	43
Lift the lip (LTL)	44
Guideline for Lift the Lip (LTL)	46
Day 3	49
How to carry out an oral health risk assessment	49
Scar management in people with cleft lip and palate	51
Quality of life and clefts	53
Implementing the FDI/Smile Train safety and quality protocol	56

Oral Health in Comprehensive Cleft Care

Introduction

Clefts of the lip and palate (clefts) are the most common birth defects of the face and mouth. Clefts occur when parts of the lip or palate, or both, or the nose do not fuse together during embryonic development. The condition can be associated with missing or extra teeth and with malformed teeth and facial structures. Children who undergo cleft surgery are often at increased risk of caries, periodontal disease and other oral health and wellbeing issues as they grow and develop. These children require regular dental care to ensure adequate monitoring, education, support and treatment to prevent oral diseases and achieve the highest possible quality of life.

Purpose and goal

The purpose of this three-day course is to improve the oral health and long-term wellbeing of children who undergo cleft surgery. It is designed to ensure all members of the cleft care team are aware of the importance of oral health and can take an active role in preventing oral diseases.

Learning outcomes

At the end of this course, participants will:

- Be aware of the importance of oral health.
- Know how to prevent and identify oral diseases.
- Know when to refer onwards.
- Be prepared to disseminate what they have learned in their workplace.



DAY 1

INTERPROFESSIONAL COLLABORATION AND CLEFT CARE

Learning objectives: Understand the importance of interprofessional collaboration in the care of people with cleft.

What is interprofessional collaboration?

Interprofessional collaboration is defined as two or more healthcare professions working together with patient involvement to ensure informed and empowered choices. Shared decision-making improves patient and professional relationships and also improves health outcomes.

The professions and healthcare providers involved in the care of people with cleft.

- **Craniofacial surgeon:** a plastic surgeon with specialized training in the diagnosis and treatment of conditions of the skull, facial bones and soft tissues who will work closely with other specialists to co-ordinate a surgical plan;
- **Paediatrician;** a physician specializing in the care of children who follows the child as he/she grows and helps co-ordinate the multiple specialists involved;
- **Orthodontist:** a dental specialist concerned with the development of the face, jaws and teeth and who evaluates the position and alignment of children's teeth and co-ordinates a treatment plan with the surgeon and other specialists;
- **Paediatric dentist;** a dental specialist who evaluates and cares for children's teeth;
- **Dental hygienist:** an oral health professional who is skilled in cleaning teeth and assists with the prevention of oral diseases;
- **Speech and language specialist:** a professional who performs a comprehensive speech evaluation to assess communicative abilities and closely supports and monitors children with cleft;
- **Otolaryngologist:** an ear, nose and throat specialist who treats the ear infections or hearing loss that may be side effects of a child's cleft condition;
- **Audiologist:** a hearing professional who will assist in the evaluation and management of hearing difficulties;
- **Genetic counsellor:** a professional who assists in the diagnosis of genetic conditions and counsels families around the prognosis regarding future pregnancies;
- **Nurse team co-ordinator:** a registered nurse who has experience in paediatric nursing and acts as liaison between the family and the cleft team.
- **Social worker:** a professional who provides guidance and counselling for a child and their family as well as assistance with community resources and referrals, i.e., support groups.

The importance of interprofessional collaboration between oral healthcare providers and the wider cleft care team

Babies born with cleft have significant needs from a wide range of healthcare specialties, and the care they receive depends on many factors, including distance from the clinic, cost of treatment and parental knowledge and beliefs. There may be an adverse effect on children's quality of life if they are not able to access the full gamut of services, especially speech therapy and oral healthcare.

It is essential, therefore, that all healthcare providers communicate effectively with the family, the child and caregivers and refer to other services to ensure the child is receiving adequate treatment and support.

Because oral healthcare is often unavailable to children with cleft, it is important that the whole cleft care team understand oral diseases and how to prevent them. The ability and confidence of all members of the cleft team to 'lift the lip' and check the health of the oral cavity is an important factor in maintaining the health and well-being of cleft patients.



UNDERSTANDING ORAL ANATOMY

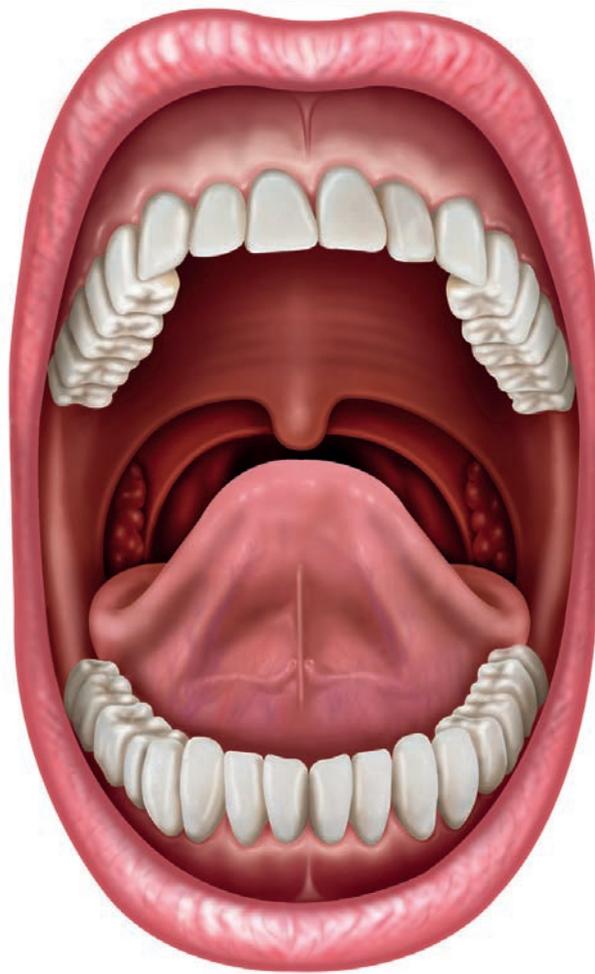
Learning objectives: Understand and identify oral anatomy, gingival anatomy, the types of teeth, eruption dates and tooth anatomy

Oral anatomy

Oral tissues and structures

It is important to be able to recognize the major oral anatomy when carrying out a 'Lift the Lip' intraoral examination of the patient. The most commonly seen structures are:

- **Lips:** two flexible muscular folds that extend from the corners of the mouth, the upper to the base of the nasal columella and the lower to the mentolabial sulcus (fold above the chin).
- **Frenum:** raised folds of tissue that extend from the alveolar and the buccal and labial mucosa.
- **Gingiva (gums):** mucosal tissue surrounding portions of the maxillary and mandibular teeth and bone.
- **Hard palate:** anterior portion of the palate which is formed by the processes of the maxilla.
- **Incisive papilla:** tissue projection that covers the incisive foramen on the anterior of the hard palate, just behind the maxillary central incisors, which the greater palatine artery and vein and the nasopalatine nerve cross through.
- **Mucosa:** mucous membrane lines the oral cavity; the mucosa can be highly keratinized, as in the hard palate, or lightly keratinized, as in the floor of the mouth and the alveolar processes, or thinly keratinized, such as around the cheeks and inner surfaces of the lips.
- **Palatine rugae:** firm ridges of tissues on the hard palate.
- **Parotid papilla:** slight fold of tissue that covers the opening to the parotid gland on the buccal mucosa, adjacent to the maxillary first molars.
- **Pillars of fauces:** two arches of muscle tissue that define the fauces, seen bilaterally at the back of the mouth.
- **Soft palate:** posterior portion of the palate; this is non-bony and is comprised of muscle and mucosa.
- **Sublingual folds:** small folds of tissue in the floor of the mouth, that cover the openings to the smaller ducts of the sublingual salivary gland.
- **Tonsils:** lymphoid tissue located in the oral pharynx.
- **Uvula:** a non-bony, muscular projection that hangs from the midline at the posterior of the soft palate.



Exercise: Label the diagram

Most tissue in the mouth should be pink and smooth, apart from the tongue that naturally has tiny tastebuds all over it. Any lumps, bumps or ulcers, or unusual red or white patches that do not heal should be referred to the oral healthcare team for further investigation.

Anatomy of the tongue

Features of the tongue include:

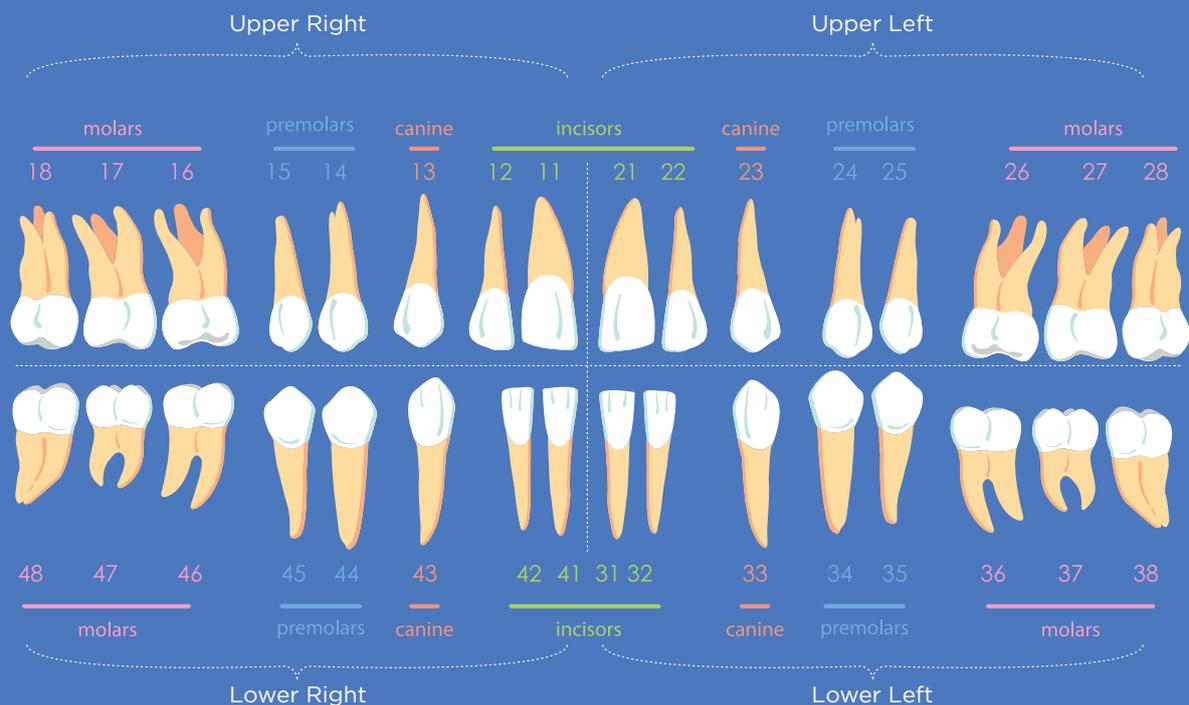
- **Circumvallate papillae:** two V-shaped rows of larger, flat, cup-shaped papillae on the posterior dorsum of the tongue, each containing taste buds;
- **Dorsal surface:** the top surface of the tongue;
- **Filiform papillae:** fine, small, cone-shaped papillae covering most of the dorsum of the tongue, responsible for giving the tongue its texture and responsible for the sensation of touch;
- **Foliate papillae:** these papillae are large, red and leaf-like, located on the posterior, lateral surfaces of the tongue; they contain some taste buds;
- **Fungiform papillae:** deep red and distributed over the dorsum of the tongue. Each one of these mushroom-shaped papillae contains a taste bud;
- **Ventral surface:** the underside of the tongue;
- **Wharton's duct:** salivary duct opening on either side of the lingual frenum, on the ventral surface of the tongue.

Types of teeth, structure, location and functions

The oral cavity is essential for chewing, digestion, nutrition and speech and thus strongly linked to quality of life.

Teeth are arranged in two arches and further divided into quadrants, each with eight teeth in the permanent dentition, totaling 32 teeth. The top arch is called the maxillary arch and it is fixed to the bottom of the skull. The bottom arch, or lower jaw, is called the mandible and it is connected to the temporal bone by the temporomandibular joint(TMJ).

Human Permanent Dentition



Tooth anatomy

Structurally, teeth are the same and comprise the crown, the part you can see above the gum, and roots, beneath the gum. Fibres known as periodontal ligaments connect the tooth to the alveolar bone.

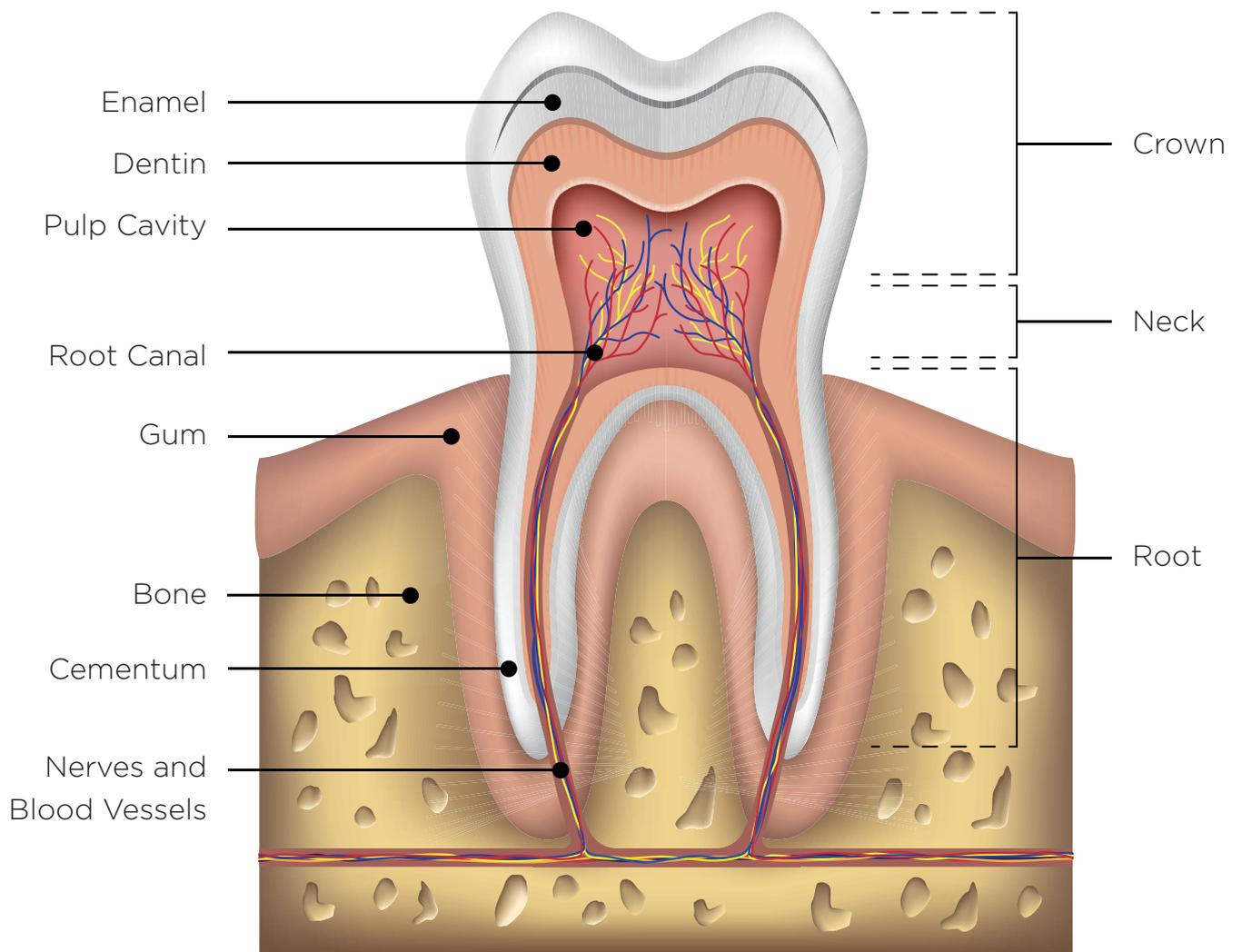
Each tooth has the same four parts: enamel, dentin, cementum and pulp.

Enamel covers the crown of the tooth and is the hardest substance in the body. Despite its strength, it is susceptible to acids produced by bacteria in the mouth and acid-containing food and drink.

The layer beneath the enamel is dentin. It is softer than enamel and is comprised of microscopic tubes known as dentinal tubules. If stimulated, they transmit pain. Because dentin is softer than enamel, when decay passes through the enamel, (the process of demineralization), and penetrates the dentin, it can spread very rapidly, leading to toothache.

The cementum is the substance that covers the root of the tooth, it is a similar hardness to the bone and formed in a thin layer. Periodontal ligaments are connect the cementum with the bone, holding the tooth in place. If this layer is exposed, it can become very sensitive.

The pulp is found in the centre of the tooth, and it is where all the nerves and blood vessels that supply the tooth are housed. If the pulp area becomes exposed to decay it can become painful, a bacterial infection can occur and may require root canal therapy or an extraction.



TOOTH ANATOMY

Types of teeth and their functions

There are 4 types of teeth in the oral cavity:

- Incisors: these are the front teeth and for cutting and biting food. There are eight incisors, two central and two lateral incisors in both the mandible and the maxilla.
- Canines or cuspids: the role of the four canines, one in each quadrant, is to tear food.
- Premolars: located behind the canines, there are eight premolars, two in each quadrant of the mouth and they are designed for chewing.
- Molars: there are usually 12 molars in the permanent dentition with three in each quadrant of the mouth. Third molars are often called wisdom teeth, and not everyone has them.

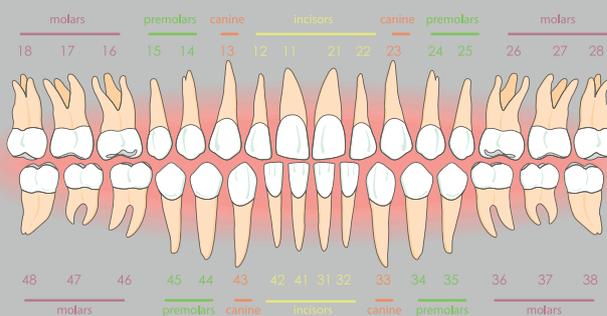
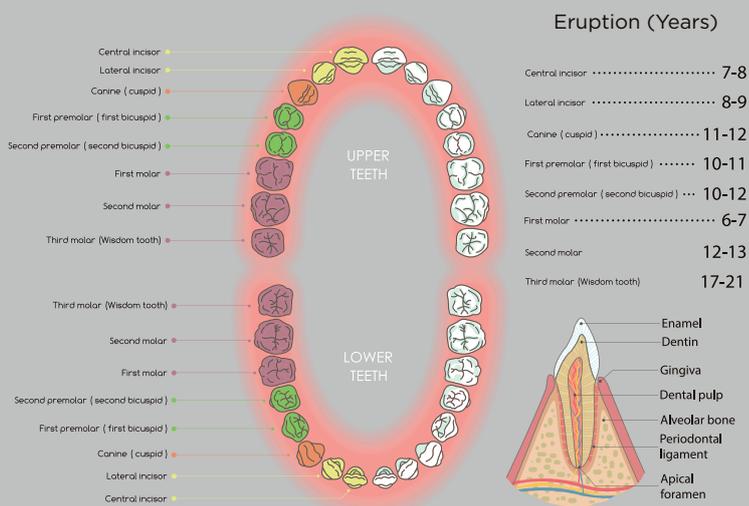
Primary Dentition

These are the first teeth to erupt into the oral cavity. Although temporary, primary teeth are important and need to be cared for as soon as they erupt through the gum tissue. Decay or early loss can lead to infection and affect the development of the permanent teeth. The primary dentition consists of 20 teeth. There are no premolars in the primary dentition.

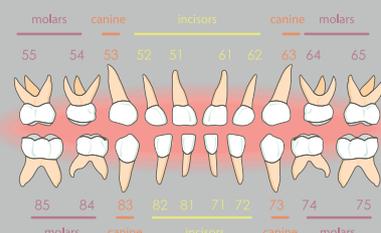
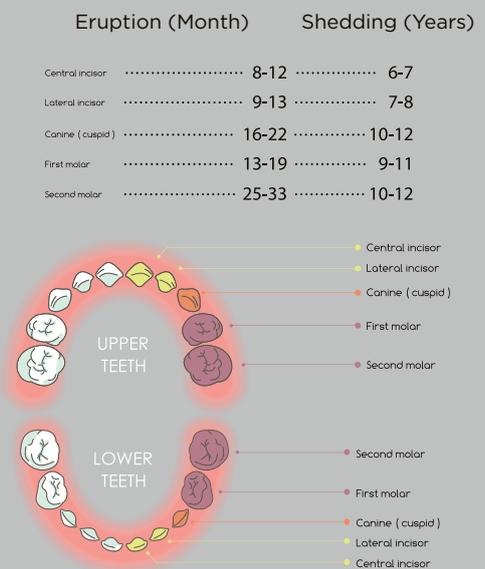
Permanent Dentition

As the primary teeth are exfoliated, permanent teeth replace them. In each arch of the mouth, there are two central incisors, two lateral incisors, two canines, four premolars and six molars. These teeth need to be well cared for to last a lifetime.

Permanent Teeth Development



Primary (Deciduous) Teeth Development



THE DEFINITION AND CAUSES OF OROFACIAL CLEFTS

Learning objectives: Understand the definition and causes of cleft.

Definition of cleft

Clefts are the most common birth difference affecting the structure of the face and oral cavity. Cleft conditions occur when parts of the lip and/or palate and nose do not fuse together during embryonic development.

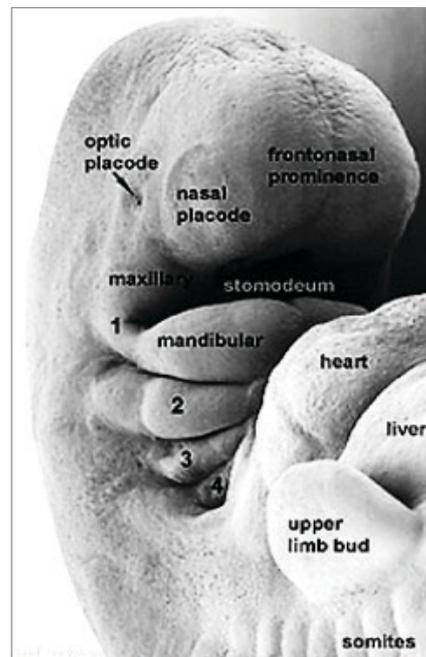
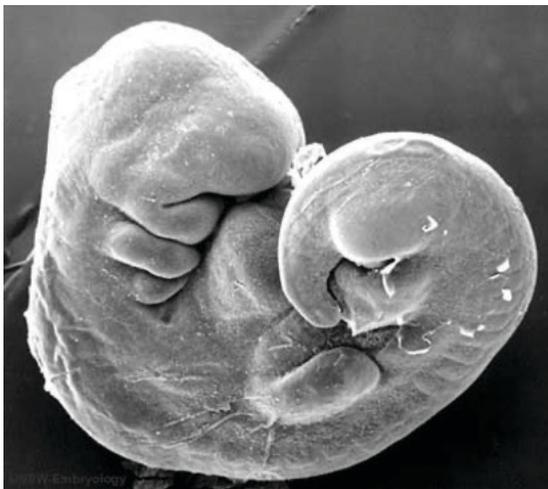
They can be divided into three general categories:

- (1) cleft palate alone;
- (2) unilateral or bilateral cleft lip, with or without cleft alveolus;
- (3) unilateral or bilateral cleft lip and cleft palate.

They are all referred to as orofacial clefts.

How do clefts develop?

By the time of the first ultrasound, in which the facial structures of the foetus can already be identified, clefting of the lip or palate will already have occurred. Development of the facial structures and form occurs early in a baby's gestation, between the fourth and eighth weeks.

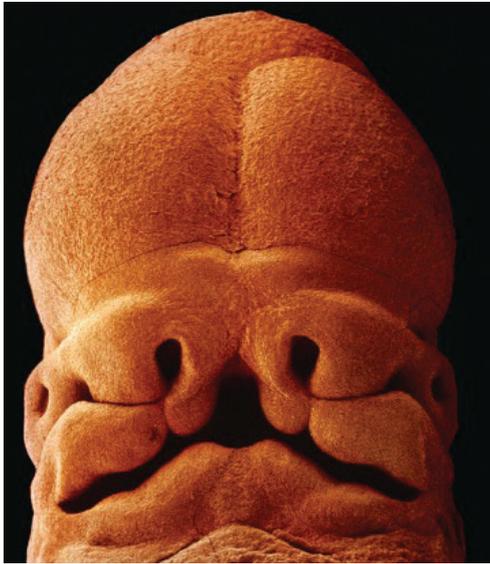


Above: **EMBRYO AT 28 DAYS**

Right: **EMBRYO AT 32 DAYS**

During the fourth week of development, a series of six paired, right and left, swellings form near the cranial, or head, end of the foetus. These are called branchial arches. The branchial arches develop into important structures in the head and neck, as well as the major arteries in the chest. The first branchial arch develops structures called the maxillary and mandibular prominences, which ultimately form the skeleton, skin, muscles, and other structures of the upper and lower jaws, respectively the maxilla and the mandible. In the centre of the upper face, a structure called the frontonasal prominence, which is separate from the branchial arches, forms, among other things, the nostrils and the philtrum. The medial maxillary prominences fuse with the frontonasal prominence during this time. Failure of this process results in a cleft lip.

The palate is also formed by the fusion of the frontonasal prominence and the maxillary prominences. Although the palate appears to be one complete structure, it consists of a primary palate, behind the front teeth, and a secondary palate, which includes the majority of the hard and soft palate. These are separated by a hole in the palatal bone called the incisive foramen. The two sides of the secondary palate begin to fuse during the eighth week of development. Failure of fusion results in a cleft palate.



EMBRYO AT 49 DAYS



EMBRYONIC DEVELOPMENT OF THE FACE

Genetics of cleft lip and palate

Between 30%-50% of clefts are related to genetic factors. Cleft conditions can be categorized as syndromic or non-syndromic.

The cause of a syndromic cleft may be associated with gene mutation, chromosomal aberrations, teratogens or environmental factors. The majority of cleft conditions are non-syndromic, which means the cleft occurs alone with no other associated conditions. These clefts usually occur when there is a genetic susceptibility or environmental factors.

Non-syndromic cleft is more common in males, with a male-to-female ratio of about 2:1.

The genetic characteristics of non-syndromic cleft palate also conform to the multi-factorial threshold (MFT) model, but the incidence is lower, and the risk of recurrence is different. There are more than 600 syndromes with a cleft of the lip or palate as an associated feature, but not all of them are hereditary.

Epidemiology of cleft lip and palate

At a global level, cleft conditions affect approximately 1 in 700 live births.

The incidence varies widely depending on geographic origin, racial and ethnic group, environmental exposures, and socioeconomic status. Asian and Native American populations have reported prevalence rates as high as one in 500. European and US populations on average have a prevalence of approximately one in 1000, whereas African populations have a reported prevalence close to one in 2500.

PREVENTION OF CLEFT

Learning objectives: Understand the prevention of cleft.

Prenatal examination and genetic counselling

For families with a history of orofacial cleft, prenatal examination and genetic counselling should be conducted. The diagnosis of cleft in prenatal routine ultrasound examination might help to prepare the family.

Maternal nutrition and cleft lip and palate

It is sound public health advice to recommend that prior to conception and in early pregnancy women should have a healthy and varied diet and vitamin supplements if required. Many studies have indicated an association between maternal use of multivitamin supplements in early pregnancy and decreased risk of orofacial clefts.

Folic acid supplement

Folic acid is a B vitamin that may have a protective effect against certain cleft conditions when taken prior to conception. It is already widely recommended for its role in protecting against neural birth defects such as spina bifida and anencephaly. A daily supplement taken by all women planning pregnancy is the recommendation of the US Public Health Service, endorsed by The American Academy of Pediatrics (AAP). A supplement of 400 micrograms of folic acid daily reduces the incidence of neural tube defects by up to 70%.

- There is uncertainty surrounding the role of other vitamins in prevention of cleft.

Medication during pregnancy

Certain medications have been shown to have an effect on foetal development; these can include:

- anti-cancer and anti-convulsant drugs;
- non-steroidal anti-inflammatory drugs and analgesics;
- antibiotics such as oxytetracycline, tetracycline and amoxicillin;
- steroids such as glucocorticoids or cortisone.

The risk of a child being born with a cleft can be almost three times higher if the mother takes medication during the first trimester. Great care should be taken if medication is necessary in the early stages of pregnancy and a doctor should be consulted.

Alcohol and tobacco

Smoking and drinking in early pregnancy increase the risk of cleft.

Passive smoking carries a similar risk, so partners and other close contacts of pregnant women should avoid or reduce smoking. Environmental contamination and pollution also contribute to risk.

Prevention of gestational diabetes mellitus and maternal obesity

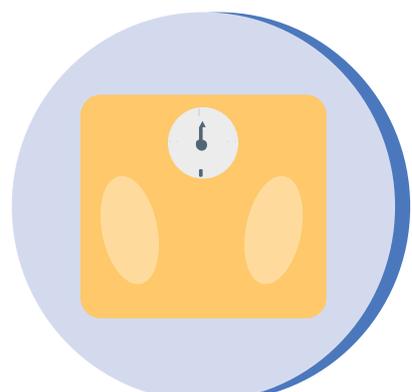
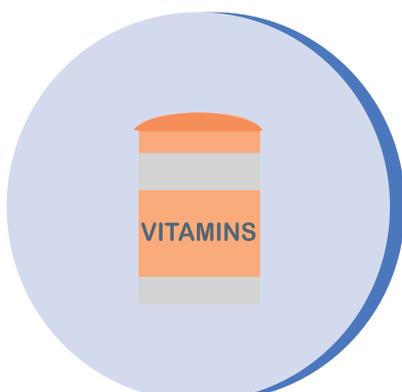
Gestational diabetes mellitus may augment the risk of cleft lip and palate. Mothers should seek medical advice on their dietary habits.

- For patients with diabetes mellitus before pregnancy, glycaemia should be controlled and closely monitored by the medical team throughout the pregnancy.
- For pregnant women with gestational diabetes mellitus, blood pressure, blood glucose, liver and kidney functions and fetal health should be closely monitored.
- A number of studies have also implicated maternal obesity as a factor that elevates the risk of having a child with a cleft.

Stress control

- Physical and/or emotional stress may be implicated in the occurrence of oral clefts.
- Anxiety, depression and other negative psychological states during pregnancy might affect the occurrence of cleft lip and palate, by hormonal dysregulation.
- A positive attitude during pregnancy is important.

PREGNANCY AND HEALTHY LIFESTYLE



ORAL HEALTH CONDITIONS COMMONLY ASSOCIATED WITH CLEFT

Learning objectives: Understand diseases and conditions commonly associated with cleft, such as caries and malocclusion.

Public health and orofacial clefts

Orofacial clefts are a major public health challenge. Children with clefts rarely escape dental complications. The surgical correction of their clefts, in addition to the medical concerns common among children with cleft, are the major focus of their care. As a result, they tend to have more decayed and missing teeth and poorer oral health compared to their peers.

These differences can be attributed to:

- dry mouth caused by mouth-breathing habits;
- less natural cleaning of the teeth due to the morphology;
- variable diet or feeding habits;
- dental anomalies;
- increased consumption of sweetened medications;
- delayed oral clearance time for foods.

All the above contribute to more carious bacteria being present in the oral cavity of cleft children. Parents and caregivers are often so concerned with other aspects of their child's health care, such as surgery, nutrition, mental health, and speech development, that they pay little attention to basic preventive dental care. All these factors put the child at a greater risk of developing ECC.

As they develop, the higher prevalence of poor oral hygiene in children with cleft may be associated with:

- (a) the presence of residual scar tissue as a result of the multiple surgical procedures carried out at the cleft region, which in turn impairs tooth cleaning;
- (b) the lack of interest in oral hygiene due to many other health problems such as otitis media, difficulty in speech;
- (c) the anxiety that children often have when they brush their teeth in the cleft area.

Other barriers to oral health care in these children will include low literacy level of parents, behaviour induced by fear and anxiety, socio-economic status, competing priorities, poor knowledge of available medical and dental services, patient-dentist relationships and socio-cultural beliefs and myths.

All these factors highlight the importance of individualized preventive oral health programmes in cleft patients.

The importance of healthy primary teeth

Primary teeth are important to children because they:

- Allow children to chew and eat properly.
- Help your child to speak more clearly.
- Maintain space for the eruption of adult teeth.
- Guide adult teeth into place.
- Help to shape the infant's face.
- Prevent early childhood caries.
- Keep future dental costs to a minimum.
- Offset the need for orthodontic treatment later.
- Reduce the risk of caries in permanent teeth.

Dental checks are important because infants with cleft conditions become accustomed to trusted caregivers touching the inside of their mouth.

Early childhood caries

Early childhood caries (ECC) is defined as the presence of one or more decayed, missing (due to caries) or filled tooth surfaces in any primary tooth. Severe ECC is characterized by a distinctive pattern of tooth decay in infants and young children, often beginning on the maxillary anterior teeth and rapidly progressing to the other primary teeth as they erupt. ECC can begin to develop as soon as teeth erupt into the mouth at 6-10 months of age, which is why an early oral health assessment and fluoride varnish treatments are so important.

The role of the oral health professional is essential to managing ECC and all oral diseases throughout the patient's life. Prevention, early detection and management are key.



Pedo Planet - Children Dental Centers,
(Chennai, New Delhi), India.

Centre for Early Childhood Caries Research (CECCRe),
Sri Ramachandra Institute of Higher Education and
Research, Chennai, India



EARLY CHILDHOOD CARIES



DENTAL PLAQUE



Malocclusion

A malocclusion describes how teeth meet together and literally means poor bite. In an ideal occlusion, teeth meet comfortably together, with the upper front teeth forward from the lower teeth. Malocclusions fall into three categories covering a range of different orthodontic problems.

Malocclusion and oral hygiene

Patients with cleft find it challenging to maintain good oral hygiene due to malocclusion. Awareness of infant oral care measures, in particular, is lacking among the population, e.g. how to clean baby teeth, when to start cleaning baby teeth, what oral hygiene aids to use and choice of toothpaste and toothbrush.

Malocclusion in the primary dentition and mixed dentition phase

Due to the impact of cleft lip and palate repair surgery, the maxillary bone development of patients is often insufficient. Under normal circumstances, the malocclusion of patients in the deciduous period is not serious. With the growth and development of the teeth, they gradually show obvious malocclusion.

All patients with complete cleft lip and palate have malocclusion of the permanent dentition. Research shows that after cleft lip and palate repair, the prevalence of malocclusion is 97%.

Among the malocclusions associated with cleft lip, the most common are cross-bite and crowding of the upper teeth. In patients with both cleft lip and palate, the teeth near the fissure often appear deformed and missing, and further away from the fissure there may be missing or supernumerary teeth. Maxillary midline deviation is common in patients with unilateral cleft lip and palate.

Common malocclusions include:

- anterior cross-bite;
- posterior cross-bite;
- maxillary anterior hypodontia or supernumerary teeth;
- upper front teeth misaligned or rotated;
- abnormal molar relationship.

Abnormality of tooth eruption and tooth number

Abnormal tooth size and position are often present in patients with cleft. Patients with unilateral complete cleft lip and palate have dysplasia and torsion of the upper central incisors adjacent to the cleft. In patients with bilateral complete cleft lip and palate, the two upper central incisors often have dysplasia and torsion. Other features can include:

- a delay to the eruption time of permanent teeth and an abnormal eruption sequence;
- hypodontia: the most common form of missing teeth is the congenital absence of the affected side incisor with the maxillary palate cleft;
- supernumerary teeth: additional teeth often appear near the fissures;
- abnormality of tooth structure: hypocalcification and dysplasia of the second premolar often appear.

The shape and symmetry of the dental arch

After the cleft lip and palate is repaired, the gap gradually decreases, and the maxillary segment is reshaped and moved closer under the action of the labial muscle. Around 50% of patients with unilateral and bilateral complete lip and palate cleft have varying degrees of maxillary dental arch asymmetry, and patients with simple palate cleft have no maxillary dental arch asymmetry.



MALOCCLUSION AND MISSING TEETH

KNOWLEDGE OF DENTAL CARIES

Learning objectives: Understand dental plaque, its role in tooth decay and the role of diet in dental plaque formation. Identify caries and its appearance in its early stages.

Dental caries

- Dental caries is a multifactorial disease, mediated by host characteristics, sugar intake, oral hygiene, microorganisms' action, as well as socio-economic factors, among others. It is the result of a complex interaction between acid-producing bacteria and fermentable carbohydrates found in the dental plaque or biofilm (explained later in this chapter). This interaction initiates the process of demineralization of the tooth surface, due to the action of acids resulting from the metabolism of carbohydrates by oral bacteria. Later, the action of saliva and the minerals presents in it, along with a proper oral hygiene, will give place to remineralization of the surface, stopping demineralization. When this cycle is interrupted and demineralization continues, the process will result in a cavity.
- Cavities can occur at different levels of the dental structure and can have varying levels of severity. Cavities can be on the surface of the enamel or be deeper, exposing the dentine. When dentine is exposed, pain and sensitivity may be present because of more direct contact with the dental nerve endings with the oral cavity. The most severe stage of tooth decay happens when dental pulp is affected, causing intense pain.
- When caries is present in one or more primary teeth, or the teeth have been lost due to caries between the time when the first tooth appears and 6 years of age, it is early childhood caries, described in the preceding lesson. This is an oral health issue which children with cleft are at higher risk of suffering.



DENTAL CARIES/TOOTH DECAY

Pedo Planet - Children Dental Centers, (Chennai, New Delhi), India.

Centre for Early Childhood Caries Research (CECCRe), Sri Ramachandra Institute of Higher Education and Research, Chennai, India

What is dental plaque?

Dental plaque, also known as biofilm, is a soft, sticky layer that adheres to the tooth surface. Biofilm is predominantly composed of oral microorganisms along with proteins present in saliva.

When the child consumes free sugars, the bacteria metabolise the carbohydrates into acidic waste products, causing the pH of the mouth to drop. Essential minerals are leached out of the tooth structure, leading to demineralisation.

In a healthy oral environment, saliva production removes this acidic environment over a time period of approximately 30-40 minutes, and remineralisation occurs. This is demonstrated in Stephan's Curve. However, if the child has suboptimal oral hygiene and is frequently consuming free sugars or fermentable carbohydrates, the mouth remains in an acidic pH, leading to dental caries.

Mechanical removal of plaque, by toothbrushing and flossing, is essential to prevent the build-up of plaque, which can harden to form calculus. Children with a cleft condition find it difficult to maintain oral hygiene and this increases the risk of oral diseases such as dental caries and periodontal disease.

Extensive caries and premature tooth loss affect the child's ability to eat and chew as well as jaw development.



DENTAL PLAQUE

Role of dental plaque in tooth decay

Some bacteria within dental plaque can produce acids by metabolizing the carbohydrates found in the mouth. The action of these acids leads to the dissolution of the minerals which make up the dental structure, and are responsible for the initiation of dental caries. This process is called demineralization.

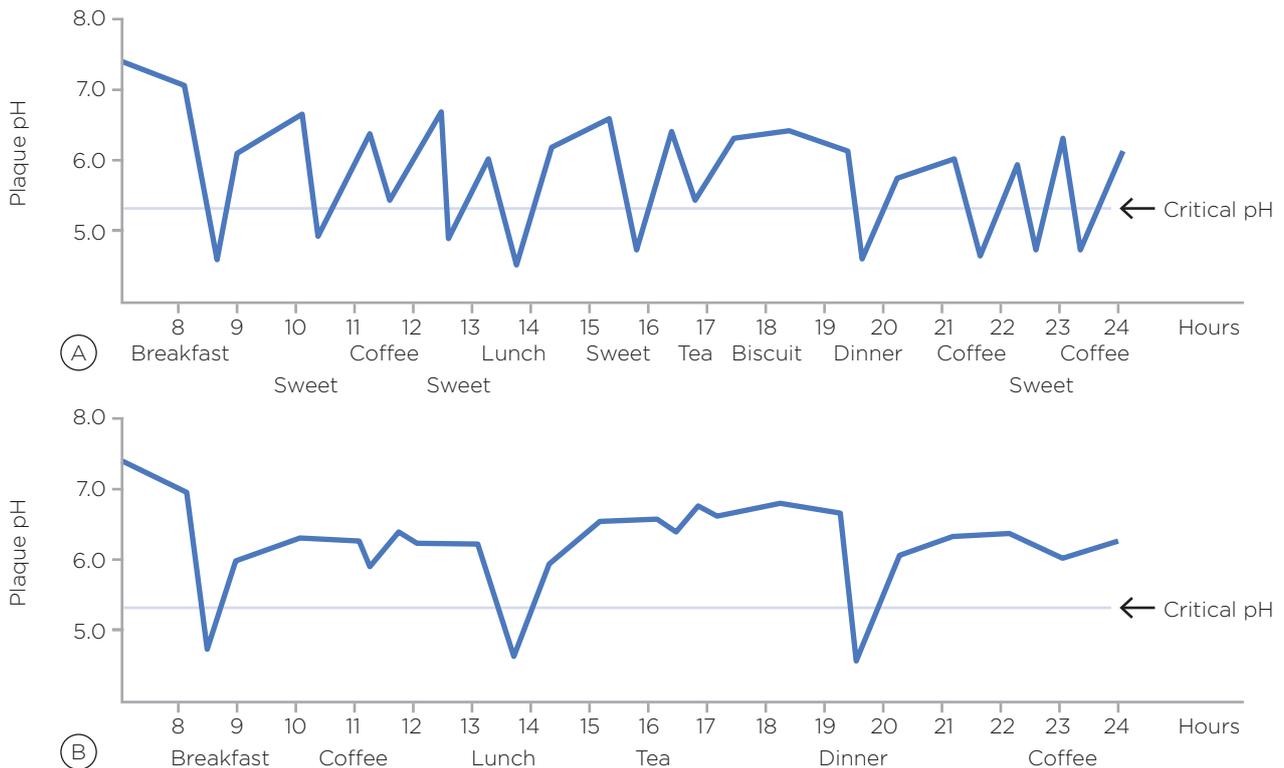
Saliva is also a key player in this process, as it acts like a buffer, neutralizing the acids and increasing the pH in the oral cavity. After eating, it takes approximately 30-40 minutes for the saliva to neutralize the mouth. The fluctuating pH of the mouth is known as Stephans Curve, as shown in the diagram.

Oral hygiene using fluoridated products will help with remineralization, a process in which fluoride, with other minerals present in the saliva, will adhere to the previously demineralized surface, stopping the process of tooth decay.

How to remove dental plaque?

- ✓ Effectively brushing teeth and interdental cleaning is the main method to remove dental plaque.
- ✓ Professional oral healthcare treatment such as oral prophylaxis
- ✓ Oral health education is essential for adequate oral hygiene and understanding of periodontal diseases.





STEPHAN CURVE

Role of diet

The food we consume contains variable amounts of carbohydrates. Higher, sugar-rich food has always been associated with caries. Food with a high potential of producing tooth decay because of an elevated amount of fermentable carbohydrates and sugar are described as cariogenic.

Some examples of cariogenic food are sweet pastries, cookies, crackers, white bread and cereals, cakes, sweetened muesli bars, dried fruits, ice cream, flavoured milk, sweet yoghurt, and sugary and carbonated beverages.

Sugar can increase the viscosity of the biofilm, making it easier to adhere to teeth surface for a longer time and more susceptible to being colonized by bacteria.

When consumed frequently, sugar is more available as a substrate for bacteria, reducing the pH of the oral cavity. Key advice for parents and caregivers is to avoid sugary drinks and sugar-added foods in-between meals.

Non-cariogenic foods are available. These may have a protective role because they do not contribute to acid production. Some examples are cheese, milk and natural yoghurt, as well as xylitol-containing products.

It is crucial to mention, that by switching to a healthier diet with less sugar content, the risk of dental caries is reduced.

DAY 2

IDENTIFICATION OF WHITE SPOTS, BROWN SPOTS AND CARIES

Learning objectives: The participants will understand how to identify early carious lesions.

White spots/hypomineralization

White spots are demineralised areas on the tooth surface, where a significant amount of minerals, such as calcium, have been lost, usually due to plaque bacteria and suboptimal oral hygiene.

White spots can also be caused by:

- dental fluorosis: the result of excessive consumption of fluoride as the teeth develop, for example, toothpaste eating as a child, or high levels of naturally occurring fluoride in water supplies;
- dental trauma to the tooth bud, causing irregularities in the hydroxyapatite structure;
- molar incisor hypomineralisation: lack of enamel development during its maturation stage, which affects the molar and incisor teeth;
- decalcification of enamel following braces: inadequate oral hygiene around orthodontic brackets.



WHITE SPOT LESIONS

Pedo Planet - Children Dental Centers, (Chennai, New Delhi), India.
Centre for Early Childhood Caries Research (CECCR), Sri Ramachandra Institute
of Higher Education and Research, Chennai, India

Brown spots

Discoloration on the tooth surface can be extrinsic - on the outer tooth structure - or intrinsic - within the tooth structure.

Extrinsic discoloration can be caused by chromogenic bacteria, dietary factors, such as tea, coffee, berries, smoking or even iron supplements. Certain mouthwashes can cause discoloration, especially those used following oral surgery.

Brown spots on the surface can also be carious, it is important to assess and correctly diagnose these.



BROWN SPOT LESIONS

Pedo Planet - Children Dental Centers, (Chennai, New Delhi), India.
Centre for Early Childhood Caries Research (CECCRe), Sri Ramachandra Institute
of Higher Education and Research, Chennai, India

Intrinsic discoloration can be caused by:

- dental fluorosis;
- tetracycline staining;
- dental caries;
- arrested caries - this occurs if dental caries is initiated but halted due to improved dietary habits or improved oral hygiene measures;
- pulp necrosis;
- developmental disorders, such as amelogenesis imperfecta and dentinogenesis imperfecta.



DENTAL FLUOROSIS



TETRACYCLINE STAINING



PULP NECROSIS



DENTAL CARIES



PERIODONTAL CONDITIONS, GINGIVITIS AND PERIODONTAL DISEASE

Learning objectives: Understand the causes, signs and symptoms of periodontal conditions and how to prevent them.

Periodontal diseases

Parents and carers of patients with cleft conditions may find it challenging to help maintain good oral hygiene. If oral hygiene is not maintained, however, gum disease as well as dental caries, can develop.

There are two types of periodontal disease: gingivitis and periodontitis.

The early stage of periodontal diseases is gingivitis:

- Gingivitis occurs when the gums around the teeth become red, swollen and bleed when brushed; it is reversible when treated quickly.
- The first sign can be blood on the toothbrush or after spitting out.
- In many cases, people will suffer from halitosis (bad breath).



GINGIVITIS

The advanced stage of periodontal disease is periodontitis:

- Periodontitis is mostly seen in adults. As periodontal disease advances, the plaque biofilm moves below the gingival margin and destroys the periodontal fibres and bone supporting the teeth, making the teeth loose.
- Prevention of gum disease is essential since periodontitis is irreversible and can cause tooth loss. With proper treatment, it can be halted.

Periodontally involved teeth can cause numerous problems, including acting as a source for local or systemic infection, affect eating, speaking and overall quality of life. Teeth can fall out of their sockets and be inhaled or ingested, leading to a possible medical emergency, as well as affecting self-esteem.

It is crucial to prevent and treat periodontal diseases at the earliest age.

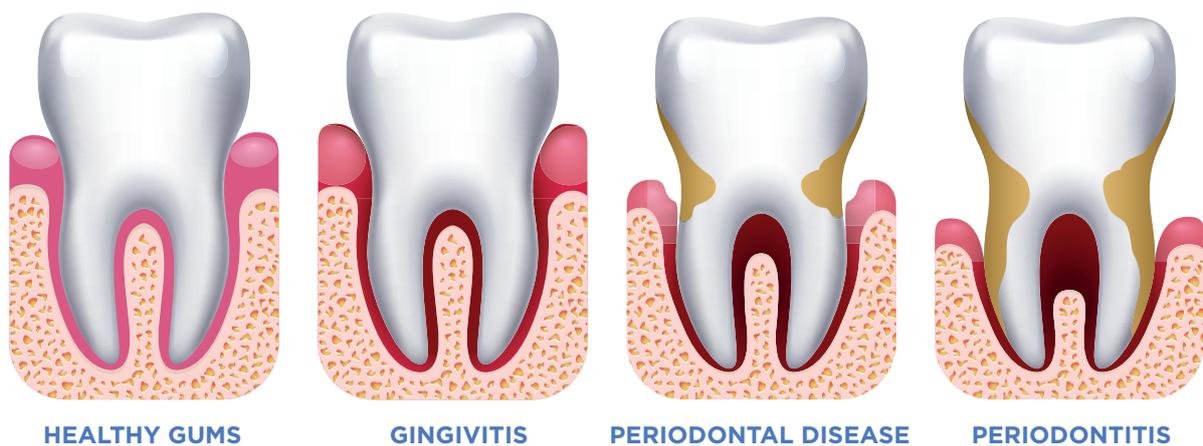


PERIODONTITIS

What are other causes of periodontal diseases?

In addition to oral biofilm, other local and systemic risk factors accelerate the occurrence of periodontal diseases.

- Local factors are those that directly influence the periodontal health status, including poor oral hygiene, dental calculus, anatomic factors, dental crowding and malocclusion, traumatic occlusion, a diet rich in carbohydrates, tobacco use and food impaction.
- Systemic factors reduce the body's resistance or increase the body's sensitivity to dental plaque, such as the patient's immune reaction, diabetes mellitus, hormonal factors, malnutrition, haematological diseases, stress, and genetic factors.



HEALTHY GUMS

GINGIVITIS

PERIODONTAL DISEASE

PERIODONTITIS

How can periodontal diseases be prevented?

As with dental plaque, periodontal diseases can be prevented. Optimum prevention can be achieved through good oral hygiene, mainly mechanical biofilm removal, such as tooth brushing and interdental cleaning. The following are also recommended:

- Regular dental check-up and professional cleaning and scaling.
- Empowering people to take care of their general health and oral health at the earliest possible age.
- Promoting the behavioural changes needed to prevent these conditions.

COMMON AND LESS COMMON ORAL DISEASES

Learning objectives: Understand other oral conditions in the patients with cleft, such as: oral candidiasis, aphthous ulcers, eruption cysts, abscesses, oral cancer, trauma, HIV manifestations and noma.

As covered in the Oral Anatomy section, the tissues of the mouth should generally be smooth, except for the tongue. Any suspicious red or white patches, lumps, bumps or ulcers that do not heal within two weeks should be referred to the dental team.

Common oral conditions

Oral candidiasis

Oral candidiasis, also known as thrush, is a fungal infection of the oral mucosa, caused by an over accumulation of the fungus *Candida albicans*. It is usually present in the different mucosal tissues of the human body as a normal part of the human microbiome.

The risk of oral candidiasis is increased by one or more factors of compromised host resistance. Among the factors are decreased local resistance, compromised immune function, uncontrolled systemic disease, such as poorly controlled diabetes mellitus, poor oral hygiene, xerostomia (dry mouth), wearing dentures or oral appliances, AIDS, corticosteroid therapy and severe anaemia.

Oral candidiasis lesions can have different appearances. Some examples are:

- One of the most common presentations of oral candidiasis, the pseudomembranous, curd-like plaques of thrush, that wipe off with cotton gauze leaving a sore, erythematous (red) mucosal surface a thin, 'beefy' appearance.
- The formation of fissures that are usually at the corners of the mouth and are referred to as angular cheilitis
- White thickening of the surface epithelium that does not rub off

Patients with clefts are at higher risk of oral candidiasis, possibly due to a poorer oral health, after surgeries and other cleft treatment such as prolonged obturator wear. Antifungal treatment eliminates oral candidiasis in most instances.



CANDIDIASIS INFECTION IN THE TONGUE



APHTOUS ULCER

Aphthous ulcers

The specific aetiology of aphthous ulcers is unknown, but possible precipitating factors include trauma, stress, sunlight, endocrine disturbances, haematological disorders, immunological factors and allergies.

Aphthous ulcers can occur where appliances or dental braces rub and cause trauma to the mouth. They are extremely painful and have a pseudomembrane and an erythematous halo. They can vary in size, number, and distribution. Lesions heal in one to two weeks without scarring.

Treatment is usually:

- a topical anaesthetic/antiseptic preparation
- diet counselling: avoid acids, such as anything citric and some condiments, to mitigate discomfort when eating
- warm salt water mouthwash to aid healing

Dental abscesses, or gum boils

An oral lesion, it can present as a localized infection of periodontal tissue linked to periodontitis.

More seriously, if caries extends to the pulp, infection and pulpal necrosis ensues, setting the stage for the formation of a periapical abscess, which is a collection of pus associated with the apex of a tooth root. It may be present as swelling in the area and sometimes could appear as a round and white eruption on the gums (fistula). Patients may complain of toothache or headaches as the abscess enlarges and pressure builds up.

Left untreated, a periapical abscess of a primary tooth may damage the underlying developing tooth bud, as well as causing other severe infections that could spread to deep tissues of the face and neck.

Dental abscesses require urgent professional dental treatment.



DENTAL ABSCESS



DENTAL TRAUMA

Ref: smile-mag.com
Management of Avulsed Permanent Teeth

Oral trauma

Oral trauma occurs most commonly in early childhood. Physical examination is first directed at determining the adequacy and stability of airway, breathing, and circulation followed by evaluation for associated head and neck injury.

In evaluating patients with orofacial and dental trauma, key elements of the history include when, where, and how the injury occurred; the child's subsequent behaviour; any prior treatment; and general health and tetanus immunization status.

Oral cancer

As you can see, oral cancer can look like some of the more common conditions listed above. It is extremely important to refer any lumps, bumps and ulcers to the dental team at the earliest opportunity.

Some 14% of all head and neck cancers are to be found in the oral cavity.

The lip is the most common site of head and neck cancer, excluding cutaneous malignancies.

Lip cancers are most often related to sun exposure, and they occur more frequently on the lower lip.

The tongue is the most common intraoral site, and most often cancers present along the lateral border of the middle third of the tongue.

Oral cancer generally requires surgical management and it is challenging because it may affect critical physiologic functions including speech, mastication and swallowing.

Oral cancer and precancerous lesions can be very diverse. However, some common signs might include: painful ulcers that do not heal within several weeks, lesions that grow very fast or unexplained lumps in the mouth or around the neck.



ULCERATIVE FORM



ULCERO BUDDING



SQUAMOUS CELL CARCINOMA

Less common oral conditions

Eruption cysts

An eruption cyst is a fluid-filled swelling, non-painful in the majority of cases, that sits over the crown of an erupting tooth. When the follicle is dilated with blood, the lesion takes on a bluish colour and is termed an eruption haematoma. The lesion will resolve without treatment when the tooth erupts. If there is pain, the patient should be referred to a dentist.

Human immunodeficiency virus (HIV) manifestations

Oral lesions can be one of the early signs of HIV infection and occur commonly in infected patients (30%–80%) for whom there is a risk of progression to AIDS.

Common oral manifestations include:

- Periodontal disease
- Candidiasis (erythematous or pseudomembranous) of the oral mucosa
- Human papilloma virus
- Primary simplex herpes
- Kaposi sarcoma, which may vary in appearance from minimal asymptomatic, flat, purple or red macules to large nodules
- Hairy leukoplakia of the lateral borders of the tongue
- Linear gingival erythema

Patients with HIV can receive the dental care they need after the possibility of significant immunosuppression, neutropenia, or thrombocytopenia has been ruled out.

Noma

The first sign of noma is sore, bleeding gums. An initial gum lesion then develops into an ulcerative, necrotizing gingivitis that progresses rapidly, destroying the soft tissues and bones of the mouth and further progressing to perforate the hard tissues and skin of the face. It mostly affects young children in Sub-Saharan Africa, between the ages of two and six years, suffering from malnutrition, living in extreme poverty and with weakened immune systems.

Due to the high mortality rate (90%) rapid identification and treatment is needed.



ORAL HEALTH INTERVENTIONS

Learning objectives: Understand oral health intervention for patients with cleft.

Prevention and oral health interventions

Awareness of infant oral care measures is lacking, i.e. how to clean baby teeth, when to start cleaning then and what oral hygiene aids to be used. All children should start learning how to brush their teeth from an early age.

Toothbrush

The correct toothbrush for a child should have the following characteristics:

- ✓ A small brush head
- ✓ Soft bristles
- ✓ An easy to grip handle
- ✓ The right size
- ✓ Suitable for children at each stage of growth

How to brush teeth

- ✓ Before dental eruption, babies should have their gums wiped after every feed, morning and night, switching to a small soft toothbrush as their teeth erupt.
- ✓ Children should be assisted until the age of eight and carefully supervised thereafter
- ✓ The toothbrush should be placed at a 45-degree angle to the tooth and gum and small circles made to clean the tooth and gum margins. The chewing surfaces of the teeth are brushed with the bristle ends.
- ✓ Toothbrushing should take two minutes; it may be useful to have a timer, an app or a song on the radio for this.
- ✓ Floss or interdental brushes should be used to clean in between the teeth and special attention should be paid to the cleft area.



The role of fluoride in preventing caries

Minerals are an important part of the dental structure, especially the enamel. As described above in the section on dental decay, demineralization occurs when the oral pH decreases below pH 5.5.

Fluoride can help to reduce and prevent tooth decay, mainly in the following ways:

It slows down demineralization in a joint action with other minerals present in teeth and saliva, such as calcium and phosphate

Along with the saliva, it participates in the remineralization of the tooth tissues that were dissolved by the acids in the early stages of the tooth decay process.

When applied topically in high concentrations, fluoride is deposited in dental enamel as calcium fluoride, which is later covered by a layer of protein and phosphate, allowing fluoride to be released slowly to the saliva

Fluoridated toothpaste

- Toothbrushing with a smear of fluoridated toothpaste should be introduced into the baby's oral hygiene from the eruption of the first tooth, making sure the baby does not swallow the toothpaste.
- Children aged between two and six years should use a pea-sized amount of fluoridated toothpaste on the toothbrush. (500 - 1100 ppm of fluoride depending on the local health policies). Children should be taught to spit but not rinse
- For children aged six and twelve years, the amount of fluoride toothpaste is about the size of a "pea" (0.5 g) each time, and it should be used under the supervision of a caregiver. (1400ppm of fluoride depending on the local health policies). Children should be taught to spit but not rinse
- Aged 12-18 and 18+ a bean-size amount of fluoridated toothpaste should be used; patients should be encouraged to spit but not rinse. (1400ppm of fluoride depending on the local health policies)

Excess fluoride

The excessive intake of fluoride during the period of tooth development can cause fluorosis. This is characterized by the appearance of white or brown areas or even pitting in the enamel, which is detrimental to aesthetics and in the most severe cases, might weaken the dental structure.



DENTAL FLUOROSIS



Mitigation of risk of enamel fluorosis: research the community fluoridation schemes and fluoride levels in water; monitor fluoride levels in the environment, especially in areas where there is exposure to elevated fluoride levels due to human activities, and determine the overall exposure to fluoride. Where practicable, monitor the prevalence of enamel fluorosis using scoring guidance systems such as those developed by WHO. In the event of high prevalence, the aim is to provide drinking-water with fluoride levels that do not produce adverse health effects, by seeking alternative water sources in areas with fluoride-rich groundwater, particularly where water consumption is high due to elevated temperatures; encourage mothers to breastfeed, even in areas with high fluoride intake, as breast milk is optimal for infant health and usually low in fluoride.

Where an alternative source is not an option, defluoridating water for drinking and cooking, using methods such as bone charcoal adsorption, contact precipitation, coagulation-flocculation/sedimentation using aluminium sulfate (Nalgonda process), activated alumina adsorption and clay.

Sub-optimal fluoride: promoting optimal oral hygiene, based on the use of effective fluoridated toothpaste; guidance on the amount of fluoridated toothpaste to be used and the concentration of fluoride present in the toothpaste should take into consideration the age of the user (especially for children) and the exposure to other sources of fluoride in the community.

Healthy diet

According to WHO, adequate nutrition is key for healthy growth and cognitive development.

A healthy balanced diet is recommended with no more than five teaspoons of sugar per day for children and for adults no more than 10 teaspoons.

Sugary snacks and drinks should be avoided in between meals. If necessary, choose whole fruit or non-cariogenic food and drinks, such as cheese, yoghurt, water or milk, to reduce the risk of developing dental caries.



Medications

Healthcare providers should try to prescribe sugar-free medications where possible

Behavioural habits

Do not allow infants and children to go to sleep with a bottle with milk or sugary drink.

Thumb sucking and pacifier use should be discouraged, allowing these habits to continue will lead to malocclusions such as prominent upper teeth, anterior open bite or posterior crossbite due to a narrow maxilla which are challenging to correct.

Care instructions for the obturator/appliance

Children in the 0-2 and 2-6 age groups will probably use a palatal maxillary orthopedic appliance, or obturator, to cover the palatine cleft and be able to eat and speak properly. These appliances must be cleaned twice a day, every day. In the first 48 hours after the appliance is installed, it must be removed and cleaned after each feed. Important points to remember are:

- After removing the maxillary oral appliance, clean it with a brush and cooled boiled water to remove any pellicle or detritus that has been formed to avoid microorganisms to grow in it. The area under the flattened nostril must be cleaned with a moist swab.
- Refer to the treating oral health professional if the appliance is producing any ulceration or bleeding. In this case, it needs to be adjusted. Advise the use of soft white paraffin in the lips and soft tissues when needed and at feeding time.
- Obturator appliances must be inserted carefully by the caregiver: slightly sideways for unilateral cleft and straight for bilateral cleft.

HOW TO CARRY OUT A BRIEF ORAL HEALTH INTERVENTION

Learning objectives: Understand how to deliver a brief oral health intervention.

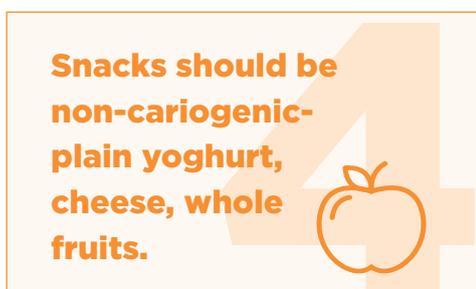
How to carry out a brief intervention to prevent oral disease

Every patient appointment is an opportunity to remind the patient and caregiver how to prevent oral diseases. Members of the wider cleft care team may see their patients on a regular basis and be ideally placed to provide a brief intervention which will lead to improved oral health over time.

This should take less than a few minutes and start with a 'lift the lip' check, which we will cover in the next lesson, to quickly review the patient's oral health status.

As we learned in an earlier lesson, dental diseases such as caries (decay) and periodontal disease are caused by poor oral hygiene and excessive sugar in the diet.

1. Remind the patient or caregiver to brush twice daily for two minutes
2. Remind the patient or caregiver to use a fluoridated toothpaste and to spit, but don't rinse away, the toothpaste residue
3. Advise the patient or caregiver to avoid snacking between meals; if a snack is needed, swap out anything sweet or sugary for items that will not cause tooth decay, like whole fruits, plain yoghurt or cheese and crackers.
4. Advise the patient or caregiver to avoid sweet or sugary drinks between meals and stick to water or milk.
5. Ask the patient or caregiver if they have visited the oral healthcare team recently and remind them to book a check-up.



LIFT THE LIP (LTL)

Learning objectives: Understand what 'lift the lip' means and why it is important.

Importance of oral health and early detection of oral pathology

Patients born with a cleft may have reduced quality of life and well-being as a consequence of their oral health challenges. In addition to the higher risk of early childhood caries, there is a higher risk of other oral issues such as supernumerary or congenitally missing teeth, and other anomalies.

Research has shown that prevention and early detection of oral pathologies can help maintain oral health and avoid complex treatments at a young age, including procedures with general anaesthesia in infants.

Promotion and prevention of oral health is important. For these reasons it is important for non-oral health professionals to implement the 'lift the lip' as well as parents and caregivers who are responsible for children at the age when prevention should begin.

Non-oral health professionals must be prepared to identify risk factors for early childhood caries and other oral health problems, and to make timely and effective interventions and, where necessary, a referral.

Lift the lip (LTL)

The LTL intervention is quick and easy, promoting a family focus on oral health and preventive care. It is usually performed on children under five years of age, but it can be applied in teenagers too.

The aim is to evaluate the front teeth and identify any sign of tooth decay, as these particular tooth sites are mostly implicated in early childhood caries, but also to identify gum disease or any other abnormality.

The intervention can be performed by non-oral health professionals as well as caregivers who should be encouraged to do it at home every month.

Using this technique, non-oral health professionals should, when necessary, refer the patient to the oral healthcare team through a simple referral form.



GUIDELINE FOR LIFT THE LIP (LTL)

Learning objectives: Understand how to use the LTL technique in each age group and when to refer.

Guideline

A non-invasive, straightforward procedure, LTL can be carried out in any setting. It is not a full clinical examination or a diagnostic test, it is intended to take only a couple of minutes to complete.

It is recommended during visits from six months of age, as part of the general health assessment.

Position the baby in a lying down position (the knee-to-knee position is recommended, with the caregiver or parent and the health professional sitting face-to-face, in close proximity, but not touching).

For toddlers, the child may be examined seated on their caregivers' lap on a chair opposite and facing the health professional. For preschool children, the child can either lie flat on an examination table or sit in front of the parent, with both the child and the parent facing the health professional.

Wearing of medical gloves is recommended for health professionals. The examination should be performed in association with a brief oral health intervention within the general health visit. LTL should be one element of an overall assessment of the risk factors for dental decay.

It is important to provide the families with LTL information resources to take home.

Advise caregivers to:

- Lift their child's lip regularly to check for early signs of tooth decay;
- Brush twice daily, for 2 minutes with fluoride toothpaste from the eruption of the first tooth, and to spit out the toothpaste but not rinse away the residue;
- Encourage healthy food and drink choices, without added sugar;
- Choose fluoridated tap water to prepare foods and as the preferred drink;
- Visit their oral health professional regularly.



What can be detected?

- Colour changes to the tooth surface, like white or brown spots
- Cavities
- Broken teeth
- Swollen or bleeding gums
- Abnormal tooth shape, surface or structure
- Dental plaque
- Abnormal movement of the lip (scar)

Referral pathways

A crucial element for the success of LTL is establishing an effective referral pathway. In patients born with cleft we recommend referring if any abnormality is observed.

The pictures below illustrate examples which would require a referral:



1) White lines along the gum line:

This early sign of decay may be reversible if treated promptly. An early referral is needed as well as a brief oral hygiene intervention.



2) Established decay:

Brown spots that do not wipe off and obvious cavity: Referral needed and provide a brief intervention on oral hygiene.



3) Advanced Decay:

tooth structure can be lost or dental abscess present. Immediate referral to their oral health professional. If general health is compromised, consider medical referral first.

DAY 3

HOW TO CARRY OUT AN ORAL HEALTH RISK ASSESSMENT

Learning objectives: Understand how to use the risk assessment guide to quickly determine if the patient is at risk for oral diseases.

How to carry out a risk assessment

The risk assessment is a tool developed to assess the level of risk of oral disease in patients with cleft. It must be performed by health professionals in the care team at all age stages and it should be filed with the rest of the patient's clinical history.

It covers a series of risk factors that, when present, on their own or in combination with other factors, increase the likelihood of oral disease

It consists of two parts, the first one is an interview to understand the risk factors for disease and second section is a LTL assessment of the oral health status of the child .

The factors to assess in the quick risk assessment are the following:

- **Low socio-economic status:** assess the socio-economic status during the interview with the parents or caregivers.
- **Frequent consumption of dietary sugars:** caregivers also need to be interviewed about the nutritional status of the child. Asking about the meals and snacks the child had the day before is a useful tool to get information about their sugar consumption. This factor is crucial as it is directly related to the development of caries.
- **Familial risk factors:** The educational level of parents can be a predictor of the oral health status of the child and it is expected that children's parents with low educational level are at higher risk of oral disease. If possible, assess the oral health status of siblings who may also be more at risk of developing oral diseases.
- **Sub-optimal fluoride exposure:** ask parents about the oral health practices of the child and assess the use of fluoridated toothpaste, ideally 1000-1450ppm of fluoride. A sub-optimal exposure applies when the child does not use any fluoride product or does not have access to optimally fluoridated tap water.
- **Active or previous caries lesion:** If any white or brown spots are observed in the front teeth by using LTL technique, noting any bleeding or inflamed gums.
- **Poor oral hygiene:** use LTL to evaluate the presence of food debris, biofilm or dental plaque in the front teeth of the child.
- **Reduced salivary flow or salivary pH:** As mentioned in previous chapters, saliva is an important factor for the remineralization of the dental surface. An easy way to evaluate the salivary flow is by visual inspection of the mucosa. Retract the lower lip and dry the zone with a gauze, the area should be wet again within one minute. Children with malnutrition may be dehydrated and have reduced salivary flow.

SCAR MANAGEMENT IN PEOPLE WITH CLEFT LIP AND PALATE

Learning objectives: Participants will understand the impact scarring has on patients with cleft, what factors influence scarring and the daily management of a scar following surgery.

Scars in patients with cleft lip and palate

The healing of cleft lip and palate repair results in fibrotic outcomes for both the lip and the palate. Scarring in this situation can have an array of aesthetic and functional consequences. Hypertrophic scarring can be common following cleft lip repair.

Scarring from cleft lip repair can cause lip asymmetry as the scar contracts leading to a shortened lip and nasal deformity on the affected side. Such scarring may require further surgical revision to restore normal aesthetics and function, which causes psychological stress, risk associated with additional surgeries and anaesthesia exposure, and significantly increased cost of treatment.

Factors influencing scarring

- The depth of injury, degree of tissue destruction, and introduction of pathogens: for scarring to occur, injury must involve the dermis, and pathologic forms of wound healing are more likely to occur if injury involves the bottom one-third of the dermis or is associated with infection.
- The location of the wound affecting variations in mechanical forces across the skin at different anatomical sites, such as: on the face, tension lines arise from interactions between the skin and the underlying muscles of facial expression; wounds running across a tension line experience greater perpendicular force and must respond with greater collagen deposition to hold the skin together, resulting in a larger scar.
- Patient demographics: it has been observed that darker-skinned and younger individuals are at higher risk of pathological healing, with hypertrophic scars and keloids, although the causative mechanisms explaining these risks are not well-understood.



Keloids and hypertrophic scars

In the skin, pathological scars such as hypertrophic scars and keloids can be unsightly, itchy, and painful. By definition, both scar types rise above skin level and are result of wounds with excessive fibrosis. While hypertrophic scars do not extend beyond the initial site of injury, keloids typically project beyond the original wound margins.

Clinical differentiation between hypertrophic scars and keloids can be problematic. A single injury may produce regions of both normal and abnormal scarring that regress or progress over time. Incorrect identification of scar type may result in inappropriate management of pathologic scar formation, and, occasionally, contribute to inappropriate decision-making related to elective or cosmetic surgery. Unfortunately, these surgeries represent a second injury that may heal with repeated pathological scarring in some individuals.



KELOID SCARRING



HYPERTROPHIC SCARRING



NORMAL SCARRING

Postoperative care and scar management

The first three months after surgery is the time when remodelling is at its peak during a normal wound healing process. While most properly designed and executed operative incisions will continue to heal without significant protest, those incisions destined for hypertrophic response will begin to reveal themselves during this period. Therefore, a monthly clinic examination of the scar is reasonable. Patients should be encouraged to continue dressing the wound with skin tape (triple-layer, one over the other). Additionally, each patient should be counselled to return to the clinic earlier than the appointed clinic visit if the wound is beginning to look “beefy” or “upset”, e.g if it starts to rise above skin level or itches considerably. During this period, a scar can undergo hypertrophic response, either mild or severe.

Current therapies for scarring

Many different therapeutic approaches have been developed to minimize the appearance and functional impact of scars. Therapies delivered at the time of wounding include dressings, tapes, and silicone sheets designed to reduce tension on the wound and suture lines. Also, if there is an increase of tissue above the normal skin level, compression therapy is recommended. This decreases the vascularity of the scar and helps to control the hypertrophy.

It is of fundamental importance not to forget that in addition to the hypertrophy of the scar, we must take care of the degree of retraction. It is suggested the scar should be regularly massaged from the columella to the vermillion border three to five times per day. The frequency should decrease as the scar gains flexibility.

QUALITY OF LIFE AND CLEFTS

Learning objectives: Participants will understand the impact of cleft on quality of life as well as well as economic factors.

Definition of quality of life

The World Health Organization defines quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment.

What makes it challenging to measure is that, although the term 'quality of life' is widely understood, individuals and groups can define it differently. Although health is one of the important domains of overall quality of life, there are other domains as well—for instance, jobs, housing, schools, the neighbourhood. Aspects of culture, values, and spirituality are also key domains of overall quality of life that add to the complexity of its measurement.

Definition of health

Health is defined by WHO as a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity. Better health is central to human happiness and well-being, while poor health has detrimental effects on both the individual and at societal level.

Since healthy populations live longer, are more productive and save more, good health also makes an important contribution to economic progress. Many factors influence health status and a country's ability to provide a good quality health service for its people.

There are five main aspects of personal health: physical, emotional, social, spiritual, and intellectual.

The Sustainable Development Goals

The Sustainable Development Goals are the United Nations blueprint for a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace and justice. One of their goals is to ensure healthy lives and promote well-being for all, at all ages.

The work of UNICEF, the United Nations children's fund, is structured around five overarching areas of well-being for every child, which are grounded in the 2030 Agenda for Sustainable Development. These five areas are that:

- every child survives and thrives;
- every child learns;
- every child is protected from violence and exploitation;
- every child lives in a safe and clean environment;
- every child has a fair chance in life.

This human rights-based approach pursues a vision of realizing the rights of every child, especially the most disadvantaged, and responds to the call to "leave no child behind", so that the rights of every child, everywhere, will be met.

Oral health

FDI World Dental Federation defines oral health as:

Oral health is multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex.

Oral diseases are the most common chronic disease and are important public health problems due to their prevalence, their impact on individuals and society, and the expense of their treatment.

The Global Burden of Oral Disease Study 2013 estimated that oral diseases affect 3.5 billion people worldwide, with untreated dental caries being among the most prevalent non-communicable disease (NCD). A follow-on study examined the global cost. Most oral diseases and conditions share modifiable risk factors with the four most significant NCDs, including cardiovascular disease, cancer, chronic respiratory disease and diabetes. These risk factors include tobacco use, alcohol consumption and unhealthy diets high in free sugars. All are increasing at a global level.

Costs of the surgical treatment of cleft

A study by Galloway et al. (2017) estimated the comparative cost of cleft treatment incorporating surgical intervention, speech and language therapy (SLT), orthodontics and orthognathic surgery. In high-income countries, where state provision or state health insurance is the most common source of funding, the average total direct cost of cleft treatment is \$10,000-\$13,000 whilst in low-income settings, where patient and charity organisations fund treatment, the cost is \$3,000-5,000. Further research and more complete data are needed to study cost differences so patients and their families have an understanding of the lifelong financial implications of cleft where costs are not covered by the state or insurance.

Risk factors

Differential in oral health status is multifactorial, ranging from social, environmental, biological, behavioural and cultural factors to economic and political factors. Limited access to oral health care services, complicated oral health care systems, a lack of oral-health-information material, and oral health literacy also play a role.

These differences arise as a consequence of factors that are largely out of the control of population groups, such as access to dental services and differential exposure to unhealthy aspects of social environments. A common factor underlying these inequalities is social hierarchy. Socioeconomic position influences exposure and response to virtually all environmental, behavioural and psychosocial risk factors. The steeper the social hierarchy, the greater the magnitude of inequalities in health.

The main priority for oral health interventions should be collaborative, enabling policies underpinned by research that addresses the main determinants of oral diseases and the shared, modifiable risk factors outlined above.

A study among adults aged 18-64 reported that social security and health insurance, low literacy levels, dental self-care, or its absence, and other behavioural aspects, such as high tobacco consumption, were major risk factors for periodontal and other oral diseases among groups of equivalent socioeconomic status.

Challenges associated with the effects of clefts

Aesthetics may be a concern for children with cleft. Almost 50% of parents of pre-adolescent children with orofacial cleft indicated that their children expressed concerns about appearance. A study carried out in India compared the responses of young people in two categories: a pre-adolescent cleft group and an adolescent cleft group. Using a 'Psychosocial Impact of Dental Aesthetics Questionnaire' (PIDAQ), researchers found that the latter scored more negatively in terms of dental self-confidence and social impact. They concluded that perceptions of the aesthetics of anterior teeth are a crucial factor influencing a patient's psychological self-belief, social confidence, and treatment need in cleft and non-cleft patients. These become more relevant as the patient matures towards adolescence and adulthood.

For cleft patients, the dental aesthetics may be influenced by hypodontia (missing teeth), commonly affecting maxillary lateral incisors, crowded and irregular teeth, malocclusion or early childhood caries (ECC).

Cleft patients have multi-system and complex anatomical, physiological, pathological and psycho-social problems. These include aesthetics, feeding, speech and language delays, dental anomalies, ear infections, psycho-social issues, such as stigmatization and reduced quality of life.



Learning objectives:

Understand:

- How to use the FDI/ST Dental Procedures Safety and Quality Protocol
- The importance of quality assurance
- Strategies for implementing quality assurance
- How to carry out periodic assessment of quality of care

Why is quality important in oral healthcare?

- By maintaining the quality of healthcare provided and adhering to the recommended health screenings, the cleft care team can improve patient health and achieve better health outcomes, e.g. fewer missed school hours due to dental pain.
- By improving the efficiency of managerial and clinical processes, organizations reduce the costs associated with mistakes, wasted materials and redundancy.
- Proactive processes that recognize and solve problems before they occur ensures that healthcare is reliable and predictable.

A culture of improvement frequently develops in an organization that is committed to quality, because errors are reported and addressed.

- A commitment to quality shines a positive light on an organization, which may result in increased partnership and funding opportunities.

The quality approach

The quality approach is defined by WHO as :

“ an approach which should make it possible to guarantee each patient the combination of diagnostic and therapeutic procedures which will ensure the best possible health outcome for them, in accordance with the current state of medical science.

This means that all healthcare providers should implement recurring, reproducible and even “measurable” processes that guarantee the quality and safety of their interventions: this is quality assurance.

Quality assurance (QA) vs. quality improvement (QI)

Quality assurance (QA) involves the development of a set of standards, and the process of a comparison of current standards with the recommended standards.

If standards are met, services are thought to be of adequate quality. If gaps are identified, plans to correct these are developed to address the problem.

Quality improvement (QI) consists of systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups.

How do we define quality in oral healthcare?

One of the most commonly used definitions for quality in healthcare is by the Institute of Medicine (IOM) and consists of six domains: patient safety, timeliness, patient-centredness, equitability, efficiency and effectiveness.



Patient safety	<p>In order to be considered safe, oral healthcare should</p> <ul style="list-style-type: none"> • Avoid, mitigate, or minimize adverse events. • Advocate a blame-free culture to facilitate quality improvement. • Learn from safety incidents to improve the quality of care. • Enact minimum safety standards.
Timeliness	<p>In order to be considered timely, oral healthcare should</p> <ul style="list-style-type: none"> • Avoid unnecessary delays in access and utilization of care. • Implement care co-ordination between healthcare providers and institutions. • Prioritize prevention; avoid early use of restorative and other treatments.
Patient-centeredness	<p>In order to be considered patient-centered, oral healthcare should</p> <ul style="list-style-type: none"> • Be respectful of and responsive to individual patient preferences, needs, values, fears, concerns, and/or cultures. • Follow a shared decision-making model when making clinical decisions. To gain a patient’s trust, the oral healthcare professional should communicate with and listen to the patient, then inform, educate and guide the patient to ensure that patient values shape all clinical decisions.
Equitability	<p>In order to be considered equitable, oral healthcare should</p> <ul style="list-style-type: none"> • Not vary in quality and availability due gender, ethnicity, cultural background, religion and belief, geographic location, and/or socioeconomic status. • Address inequities in oral health service design, planning, and commissioning. • Incorporate equitability in the design of policy and clinical practice guidelines.
Efficiency	<p>In order to be considered efficient, oral healthcare should</p> <ul style="list-style-type: none"> • Encourage prevention • Focus on patients’ oral health needs as the central basis for resource and workforce planning. • Form an integral part of medicine and discourage the dental-medical divide.
Effectiveness	<p>In order to be considered effective, oral healthcare should</p> <ul style="list-style-type: none"> • Be informed by the most recent available scientific evidence and guidelines. • Be provided to patients who will benefit from the care • Aspire to minimize harm

Why do we need a quality approach?

A quality approach in healthcare is imperative and reflected in diverse legislation:

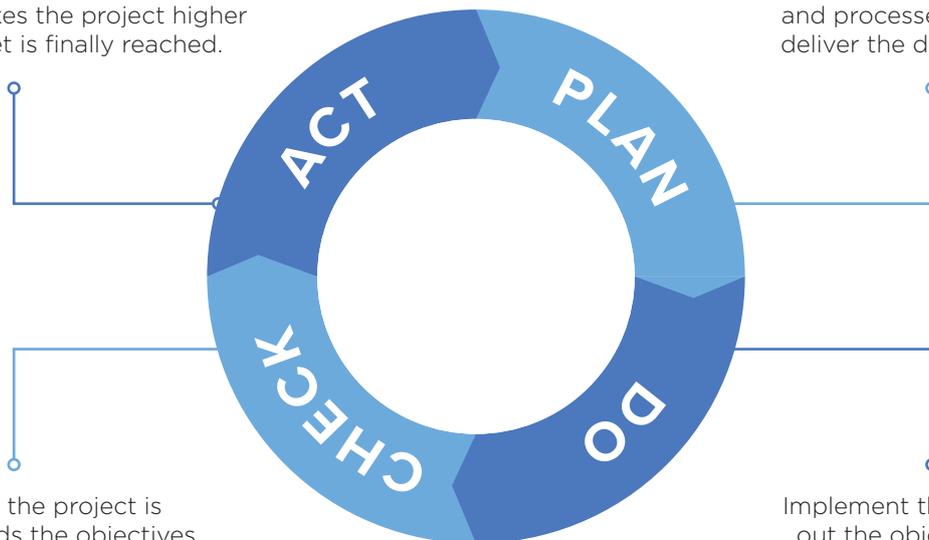
- Legal and regulatory context: quality in healthcare is governed by a set of laws and regulations in force in each country.
- Administrative regulations: all clinicians should be appropriately trained and registered to practice in the chosen country, and stay within the “scope of practice” defined by legislation or regulation. There are many other administrative regulations, i.e. the obligation to take out civil liability insurance or various other types of insurance.
- Health regulations and good practice recommendations: specific measures for patient safety, defined by law and regulations under the control of the country’s health authorities i.e.regulations on ionising radiation.
- Ethical regulations: unlike business, dental offices and health centres have a responsibility for patient well-being. This is underpinned by a code of ethics which specifies what can and cannot be done. An official body, most often the medical or dental council, is responsible for ensuring that these ethical rules of confidentiality and patient safety are respected.
- Labour legislation: the rules of labour legislation set out in national legislation, would apply to staff members, so that practitioners need to be familiar with them.

Implementing quality improvement

Implementing new procedures to comply with quality in healthcare standards, such as the FDI/ST Systems Level Organization, must be tested and validated, usually through a four-phase cycle of planning, doing, studying, and acting - the PDSA cycle:

React and improve. Take the necessary corrective measures to reduce gaps and make sure that what has been achieved will remain stable. Each turn of the wheel takes the project higher until the target is finally reached.

Establish quality objectives and processes required to deliver the desired results.



Check that the project is moving towards the objectives, study the results, measure effectiveness.

Implement the plan, carry out the objectives from the previous step.

Steps for implementing quality improvement

Steps	Questions & recommendations
Identify and assess the problem Identify specific objectives	What problem do you want to address? What outcome measure will show the problem was resolved?
Produce a written description of the roles and responsibilities of each member of the dental team to reach the objective	Who is best positioned to be the champion and the leader of the project? Who has the clinical knowledge and leadership skills to serve as a project leader? Which staff members will participate in the core collaborative and work proactively to improve quality?
Education and training of staff to implement the QI measure	Train all staff in the new method adopted to solve the problem or improve the system
Establish a test group who will implement the QI measure	The test group carries out an assessment of the new system with all members of the dental team.
Implementation of QI measure	Implementing changes in small manageable steps to allow for continual appraisal and review. Reducing the risk of failure and negative staff responses
Verification and outcome assessment	Review of the first implementation cycle to review the process and make any necessary adjustments
Repetition of the quality improvement process and identification of new objectives if necessary.	The improvement process must have adequate time to succeed. It is important to review in the longer term to ensure the new habit and process has become a part of the daily routine.

Monitoring and evaluation

Quality improvement is an ongoing process, and it is important to create a culture in your clinic where staff can make suggestions openly to improve patient care, procedures or systems. The team leader should use the FDI/ST Dental Procedures Safety and Quality Protocol as a basis for ensuring minimum standards of safety, care and hygiene and continue to develop this resource to continuously improve the standards you provide.

Monitoring and evaluation should be carried out routinely, as new quality improvement measures are introduced. One person should be assigned this responsibility, usually the clinic manager.

