Early Childhood Caries
A Continuing Epidemic Oral Health Problem in the United Arab Emirates

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Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary (milk) teeth. The etiology of the condition is a combination of factors including frequent consumption of fermentable carbohydrates as liquids, especially when the baby is sleeping, with on-demand breast- or bottle-feeding. Other factors include oral colonization by cariogenic bacteria (especially mutans streptococci), poor oral hygiene and poor parent-teaching good oral hygiene practices and terminology, aetiology, prevalence, clinical picture, complications and management and a solution to the continuing problem of ECC is suggested.

Introduction
Caries or dental decay in children has been known to exist for many centuries [1]. Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary (milk) teeth. It is defined as the presence of one or more decayed, filled or missing tooth surfaces in any primary tooth in a child 71 months of age or younger [2,3]. It can result in considerable suffering, pain, reduction of quality of life of affected children and disfigurement and frequently can compromise their future dentition. The etiology of the condition is a combination of frequent consumption of fermentable carbohydrates as liquids, especially at night, with on-demand breast- or bottle-feeding, oral colonization by cariogenic bacteria (especially mutans streptococci) and poor oral hygiene [4]. In most cases, the aetiology will be a combination of several of these factors. The prevalence has been reported to vary worldwide. Higher prevalence has occurred in children from lower socio-economic status families, migrant and ethnic minority populations [5].

In the United Arab Emirates (UAE), ECC is the most common childhood disease. The prevalence of ECC in the UAE has been reported as 93.8% in 5-year-old children [6]. Prevention of ECC can be achieved by the education of prospective and new parents, as well as by the identification of ‘high risk’ children [7]. Strategies have focused on the individual mother and child by preventing transfer of cariogenic bacteria from mother to her infant, using preventive agents such as fluoride and teaching good oral hygiene practices [8]. Community-based approaches have been attempted. An example of a successful program was reported by Kowash et al [9] which investigated the effect of dental health education provided by trained, non-professionals (not dentists) carrying out regular home visits in a low socio-economic high-caries area in Leeds, UK. The study was able to demonstrate a significantly reduced occurrence of ECC after three years.

The treatment of ECC is very costly, time-consuming and in most cases, requires full dental rehabilitation under general anaesthesia by a paediatric dentist. Unfortunately, in many countries, even in the developed world, these carious teeth end up being extracted.

This paper provides an updated evidence-based review of ECC. The literature in regards to ECC, definition and terminology, aetiology, prevalence, clinical picture and management is discussed. A solution to the continuing problem of ECC is suggested.

Definition and Terminology of ECC
ECC has been defined as “the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces” in any primary tooth in a child 71 months of age or younger [2,6]. In children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC). From ages three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a de-
Pattern and Clinical Appearance of ECC

ECC has a specific pattern and clinical picture, it is a form of rampant caries with the only feature differentiating it from generalized rampant caries being the absence of decay of the mandibular incisors (Figure 1). The most commonly affected teeth in ECC, in addition to the mandibular incisors, involve the maxillary incisors (the deciduous ones) and canines. The difference between these teeth is less than in the maxillary incisors. The mandibular incisors are not affected because the buccal surface of the tooth is usually held above the tongue during sucking, so that decay is much more protected by the tongue and also by the flow of saliva which is saliva from the mouth floor (Figure 2). The role of the infantile physiological tongue pattern during the period of sucking is very important in protecting the lower incisors [4].

In most cases of ECC, the first clinical sign is a band of dull white demineralization on the inner lingual surface of the primary incisors (Figure 2). The enamel demineralization is caused by certain bacteria, whose main substrate is sucrose. The reducing sugar is cleaved by this bacterial menu into monosaccharides, two of which are used to form carboxylic acid. The acid is responsible for initiating the process of decalcification. In ECC, the process progresses rapidly and the cariogenic potential is such that the enamel is destroyed in a few months [5].

Etiology of ECC

The exact etiology of dental caries is still obscure. However, there is good scientific evidence to show that, for caries to occur, four factors must be present: 1) bacteria, 2) fermentable carbohydrates present in the diet, 3) acidity, and 4) time, which is the length of time that the bacteria have contact with the teeth [5]. The bacterial menu can cause dental decay if it is not removed by tooth brushing or professional treatment [6]. In ECC, the frequency of tooth brushing is usually low, and dental prophylaxis is not usually carried out [7].

Consequences and complications of ECC

In the severest degree and in its extreme form, ECC can cause severe pain and discomfort, which may lead to stopping the food itself, preventing the child from eating and thus from growing properly. In severe cases, pulpal necrosis in primary teeth may lead to a dental abscess formation which can cause pain and damage the developing permanent tooth. If there is not enough time for premature extraction, primary tooth loss may result in various orthodontic complications (Figure 2). Premature extraction of primary maxillary incisors may also lead to a loss of space in the arch, which may result in untreated carious lesions leading to pain, affecting the child’s quality of life, and delaying the child’s ability to eat and speak effectively [8].

Management of ECC

Prevention is the solution for the continuing problem of ECC. Despite the high potential for a successful method for proper restoration of decayed teeth, recurrence of decay and its comorbidities often appear. The presence of ECC can cause medical and dental consequences. When present, it can be a significant cause in infants. The socio-economic consequences of ECC are accepted as the correct term by most dental clinicians and educators [11].

Diet: Human breast milk has not been epidemiologically associated with caries. Frequent night time bottle feeding with milk is associated with but not consistently implicated in ECC. Breastfeeding greater than seven times daily after 12 months of age is associated with increased risk for ECC. Night time bottle feeding with juice, repeated use of a no-spill cup and frequent in between meal consumption of sugar-containing snacks or drinks (e.g. juice, formula, soda) increase the risk of caries [35, 36]. Therefore, it is recommended that infants should not put their hands in a cup after one year of age. However, continuing a bedtime bottle with water containing fermentable carbohydrates should be avoided.

Fluoride: Optimal exposure to fluoride is important to all dentate infants and children [17]. Decisions concerning the administration of fluoride are based on the unique needs of each child. The use of fluoride for the prevention and control of caries is documented to be both safe and effective [17].

Community-based preventive programmes

To solve the problem of ECC there should be collaborative efforts of caregivers, health professionals, and the community [45, 47]. It is recommended that public health or community approaches are more appropriate and effective than individuals or behavioural approaches. Oral health professionals and hygienists should be trained for skills, as necessary, for developing community-based initiatives and dental programs. These skills would also be transferable to individuals and groups as they can be used for oral health education.
education program through regular home visits to mothers with infants, commencing at or soon after the time of the eruption of the first deciduous teeth, was shown to be effective in preventing the occurrence of caries, improving oral hygiene and dental attendance of young children. An added benefit was that the mothers of the children also significantly improved their oral hygiene in terms of debris, gingivitis and calculus scores [9]. Young children are dependent on their parents or caregivers for their daily dietary and oral hygiene practices. Therefore, it is important that the dental health messages should focus on educating and changing the behaviour of parents or caregivers. Moreover, the dental health messages should be practical by giving alternatives, for example substituting milk with water in baby bottles at night for those who find it difficult to stop night-time bottle feeding. They should also consider the socioeconomic status of the parents and be culturally sensitive [9]. The benefit-cost (B/C) and cost-effectiveness (C/E) of a long-term dental health education program to mothers with young children through repeated home visits were evaluated [45]. Comparisons were made for B/C and C/E with results from a clinical trial of a slow releasing fluoride device, community water fluoridation and a school based fissure sealant program. The results showed that dental health education programs for mothers of young children starting at 8 months of age gave better B/C and C/E ratios than other preventive programs.

Restorative treatment of ECC

In recent years there has been a shift from the traditional (drill & fill) to a more conservative treatment modality (seal to heal) with better understanding of the caries process biology. Managing caries through remineralization processes and other protective mechanisms. The goal should be to minimize lifelong caries experience while performing the least possible intervention consistent with levels of risk (Table 1).

The type of restoration chosen depends on the tooth to be restored, present and past caries history, child cooperation and medical history. For example a decayed primary molar in a special need child is best restored with a durable restorative like stainless steel crowns (SSC). A multi-surface decayed primary molar also should preferably be restored with SSC [46]. Groovely decayed maxillary incisors are best restored with either composite strip or zirconia crowns with or without pulp therapy (Figure 3). Depending on patient cooperation, the severity and number of decayed teeth and medical history, dental treatment of paediatric patient can be performed under behaviour management and local anaesthesia, which is considered to be the best option in terms of cost, safety and acceptability to parents or caregivers. Other alternative options include oral or intravenous sedation and general anaesthesia (GA). Full dental rehabilitation under GA (Figure 2) is preferred by many clinicians in uncomplicated preschool children requiring comprehensive dental care or those with special needs. All restorative techniques exhibit strengths and weaknesses for example – sensitive adhesion can reach the level of compomers. — Resin composites after rubber dam application and correct technique — minimally invasive and low-cost treatment modalities such as atrumatic restorative technique (ART) is important especially in developing countries. It helps in slowing caries progression and hence minimizing the child’s discomfort and preventing other decay complications. Studies have shown that, although caries causes demineralization of dental hard tissues and dematuration of collagen, the inner layer is minimally even not even infected by bacteria [44]. The inner part of decayed dentine contains a high concentration of minerals and can be remineralized [45]. Management of ECC should take into consideration the biology of dental tissues, remineralisation process and other protective mechanisms. The goal should be to minimize lifelong caries experience while performing the least possible intervention consistent with levels of risk (Table 1).

The full list of references is available from the publisher.