



Epidemiology, Aetiology, Risk Assessment, Societal Burden, Management, Education, and Policy for Preventing and Treating Caries in Young Children Around the World

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ABSTRACT

Throughout history, dental caries in pre-school children have been referred to by various labels and linked to a wide variety of aetiologies. Dental caries in preschool children had been reported as “Comforter Caries” for the first time in 1911, and as “Milk Bottle Mouth” for the first time in 1962, before the “Early Childhood Caries Conference” was held in 1997 and was funded by the NIH. Throughout the years, it has also been referred to as “Baby Bottle Syndrome”, “Nursing Bottle Caries”, “Baby Bottle Tooth Decay”, and “Nursing Caries”. These sources usually implied a causal relationship between improper feeding with a baby bottle and the development of dental caries in preschool-aged children. The current nomenclature for early childhood caries, abbreviated as ECC, refers to a more complicated condition associated with frequent ingestion of sugar in an environment with enamel-adherent bacteria. This disease is not necessarily linked to bottle feeding. This paper provides a unified and comprehensive analysis of the ECC, including its description, aetiology, risk factors, societal costs, management, educational curriculum, research, and policy considerations.

1. Introduction

Caries risk assessment (CRA) is the method used to assess the chance of an individual patient or a number of children (Fontana & Gonzalez-Cabezas, 2019) acquiring carious lesions during a particular period or the possibility that there would be a change in the size or activity of lesions that are already present (Cagetti et al., 2018; Gannam, Chin, & Gandhi, 2018). CRA may be performed on either group of children or individual patients (Reich, Lussi, & Newbrun, 1999). At the community level, the approach may be used to influence the creation of public interventions, as well as the allocation of time and resources to those with the greatest need. Assessment of the particular child’s level of risk is an essential component that must be taken into consideration throughout the decision-making process and treatment of early years caries. In an ideal world, the various risk categories should be connected to personally tailored preventative interventions and follow-up intervals (Cai et al., 2019; Lamba, Nagpal, Chowdhari, Hotwani, & Gunwal, 2021; Wu, Bian, Wan, Ma, & Sun, 2021). The majority of dentists use some version of CRA in their work with children; however, the formal, objective and documented use of CRA in ordinary practice seems to be less widespread (Yeo & Lee, 2022).

A variety of CRA instruments may be used in pre-schoolers, and their use is highly suggested. The most frequent examples are algorithm-based software applications, physical forms, and CAMBRA checklists. Caries risk may be broken down into three categories: “low risk,” “moderate risk,” and “high risk.” In general, “low risk” is the lowest category. There is a general agreement that “low risk” refers to the lack of disease-related risk factors as well as the existence of preventive variables; however, there is no generally recognized meaning of the terms “moderate risk” or “high risk” (Humphreys, 2021).

Sadly, no research has confirmed types of risk in prospective trials, including preschool-aged children. Five longitudinal studies had a moderate to low risk of bias. This information was gleaned through an updated search conducted up to August 2018, using the same methodology as a prior systematic review. There was a positive association seen in all of the investigations between both the baseline risk group and the actual development of caries, with sensitivities varying from forty-four (44) per cent to hundred per cent and particularities ranging from 6% to 100% (Kumar et al., 2021; Li et al., 2022; Munblit, Sigfrid, & Warner, 2021).

This paper is organized in the following format: Section 2 talks about the effect of ECC on aspects of quality of life connected to oral health. Section 3 focuses on the clinical management of dental caries in young children. Section 4 is dedicated to explaining the management and administration of the ECC by the community. Section 5 is related to education and management in this issue. Section 6 is dedicated to conclusions and recommendations.

2. The Effect of ECC on Aspects of Quality of Life Connected to Oral Health

In addition to identifying the prevalence of ECC, it is necessary to take into consideration the effects of ECC on the day-to-day lives of children and their families, including the physiological, social, and psychological repercussions of the condition. This has consequences for our understanding of how ECC affects the overall life quality of children, as well as the burden it takes on the children's lives, their parents and the communities in which they reside. Because of variations in cognitive growth and capacity (including among children of the same age), the fast-changing dentists and facial characteristics that take place during early life, as well as the changes in psycho - social consciousness with age, it can be difficult to evaluate how children feel about their own oral health and how it affects their life (Pereira et al., 2022).

To this aim, it has been suggested that parents' and caregivers' opinions should be relied on as a "proxy" for the children's perspectives on their dental health. There is a possibility that the reports made by parents or main caregivers will vary from the children's perceptions of their dental health. As a result, "proxy" reports are regarded as supplementary rather than replacement data sources about children's oral health. However, it is common knowledge that it is best to rely on the reports of the child's parents or primary caregivers when it comes to very young children. This is because of problems with recall and the young children's limited capacity for abstract thought concerning their attitudes toward health and illness.

3. The Clinical Management of Dental Caries in Young Children

Primary prevention of ECC should begin before the onset of illness; this is the most crucial step that can be taken to bring down the overall prevalence of ECC across the globe. It has been shown that the timely administration of preventative interventions and educational material to the parents and caregivers helps lower early childhood complications (ECC). Because of the increased frequency of their interactions with the family in the first several years of the child's life, medical experts, nurses, and other healthcare workers may have more opportunities to educate the child's caretakers than dental practitioners (Cheng et al., 2022).

Therefore, it is essential for these providers to be aware of caries risk and protective factors and to use this information to promote primary care preventive messages. These messages include limiting free sugar intake in foods and drink for children under the age of 2 years; avoiding night-time bottle feeding with milk or drinks containing free sugars; and avoiding night-time bottle feeding with baby bottles and breastfeeding beyond the age of 12 months, especially if frequent and nocturnal.

Additionally, adequate exposure to dietary fluoride is essential for all dentate new-borns and children. Dietary fluoride may be supplied through fluoridated water, salt, and milk. This is because fluoride helps strengthen teeth. At home, topical fluoride may be administered to a kid by brushing their teeth twice a day using fluoridated tooth-paste. This will supply fluoride to the tooth enamel. The first year of a child's life should ideally include at least one visit to the dentist for comprehensive treatment. Children at risk for dental cavities should get frequent fluoride varnish applications containing 5% (Knapp, Marshman, Gilchrist, & Rodd, 2021).

4. Management and Administration of the ECC by the Community

Community-based approaches to the management of ECC often concentrate on high-risk, poor socioeconomic, and disadvantaged groups, and they use well-established strategies to prevent caries. ECC has been successfully reduced in indigenous, low-income, and migratory communities all over the globe via the implementation of strategies sensitive to cultural differences, including community-based engagement and aligned with the respective groups' cultures. Similarly, personal interventions such as home visits and telephone interactions might decrease early childhood caries by boosting caregivers' health literacy and their sense of self-efficacy to modify habits that would enhance the dental health of their new-borns. On the other hand, an increase in knowledge could not change people's oral health practices or slow the progression of caries (Rahman, Simmons, Shone, & Ratna, 2022).

A significant ECC management tool used in a variety of community programs is an early dental visit plan beginning at one year old. The preventative dental exams need to include caries risk assessment (CRA), education on how to clean one's teeth, nutritional counselling, anticipatory assistance, and constructing a dental home. Increasing the number of partnerships formed with primary care providers other than dentists, such as primary care physicians, paediatricians, and midwives, for the purpose of integrating primary care promotion into general care, could help to increase the number of infants who have access to early preventive exams and referrals for dental care.

In addition, collaborations with the personnel of nursery schools to do school-based oral exams and teeth brushing help lower the prevalence of ECC in so many socially disadvantaged populations all over the globe. 54 Studies also show that current greater community health services may be employed to give education on oral hygiene and proactive counselling

to pregnant women living in poor socioeconomic groups to cut down on the prevalence of ECC in such regions. Enhancing one's health literacy may also use of telemedicine and social media platforms (McKenzie et al., 2022; Miles et al., 2021).

5. Education and Management in this Issue

The first step in embracing evidence- and risk-based prevention for ECC and giving it equal merit to the more conventional surgical parts of caries treatment is the development of a curriculum on ECC in dentistry schools. This curriculum will focus on early childhood caries (Prabhu & PS, 2022; Sitthisettapong, Tasanarong, & Phantumvanit, 2021).

Elements of ECC can be mapped into the following five domains, as proposed by the International Cariology Curriculum: experience and understanding; risk analysis and treatment plan; precautionary management; rehabilitative treatment; and public health and clinical policy. The education system of ECC can be based on these five domains (Naidu, Nunn, Pahel, & Niederman, 2021; Rahman et al., 2022; Sitthisettapong et al., 2021).

Building an agreement on the curriculum's content is necessary for its distribution and execution, as are developing tactics for dissemination, putting the curriculum into practice at educational institutions all over the globe, and forming partnerships with powerful organizations (Deghatipour, Ghorbani, Makhlesi, Ghanbari, & Namdari, 2021; Rahman et al., 2022; Woodley, 2022). Figure 1 illustrates the four aspects of enhancing children's healthcare system management.

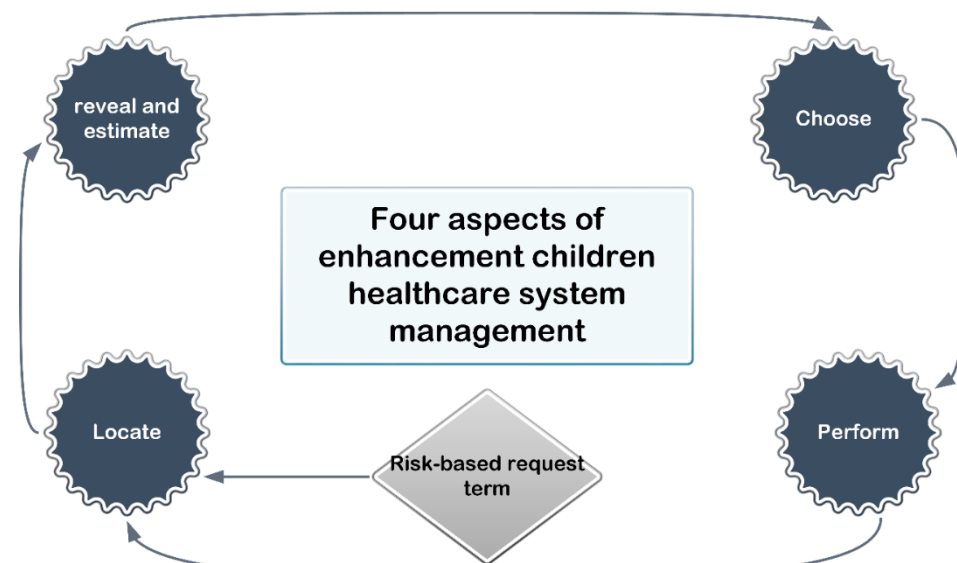


Figure: 1 Caries outcomes centred paradigm on maintaining health and preserving tooth structure via the use of individualized risk-based management

6. Conclusion and Recommendations

Caries in early infancy continue to be a very widespread illness that is seen all over the globe. This disease significantly negatively influences the quality of life of both children and their parents (Chiatoh-Gwanmesia & Gao, 2022; Lee, Schroth, & Lawrence, 2022; Verbrugge, 2022). Methods that may be used to bring down its prevalence include the following:

- Primary, intermediate, and ultimate prevention are included in managing the illness process that begins in a child's first year. The kind of prevention that is used is determined by the requirements of the child (Tušek, O'rouke, Lekić, Tušek, & Tušek, 2020).
- An education that is based on evidence, as well as systems of payment that are based on risk, encourages a move away from surgical surgery and toward preventative care (Malik, 2022).
- Preventative measures for pre-school children should include the following: (a) preventing children under the age of two from consuming sugar; (b) limiting children over the age of two from consuming sugar; and (c) encouraging children to clean their teeth twice daily with caries prevention tooth-paste that contains at least 1000 parts per million of fluoride and using an amount of paste that is appropriate for their age (Pratamawari, Atikasari, & Bramantoro, 2022; Tinanoff et al., 2019).

- Additional studies on ECC preventative management, the quality of life as it relates to oral health, and healthcare management to support the advantages of lowering its occurrence globally (Chai et al., 2020; Naidu et al., 2021; Saikia et al., 2022).

References

- Cagetti, M. G., Bontà, G., Cocco, F., Lingstrom, P., Strohmenger, L., & Campus, G. (2018). Are standardized caries risk assessment models effective in assessing actual caries status and future caries increment? A systematic review. *BMC Oral Health, 18*(1), 1-10.
- Cai, L.-M., Wang, Q.-S., Luo, J., Chen, L.-G., Zhu, R.-L., Wang, S., & Tang, C.-H. (2019). Heavy metal contamination and health risk assessment for children near a large Cu-smelter in central China. *Science of the Total Environment, 650*, 725-733.
- Chai, H. H., Gao, S. S., Chen, K. J., Duangthip, D., Lo, E. C. M., & Chu, C. H. (2020). *A kindergarten-based oral health preventive approach for Hong Kong pre-school children*. Paper presented at the Healthcare.
- Cheng, L., Zhang, L., Yue, L., Ling, J., Fan, M., Yang, D., . . . Zhao, J. (2022). Expert consensus on dental caries management. *International journal of oral science, 14*(1), 1-8.
- Chiatoh-Gwanmesia, M., & Gao, M. (2022). Dental Caries in Children and Community-based Preventative Education.
- Deghatipour, M., Ghorbani, Z., Mokhlesi, A. H., Ghanbari, S., & Namdari, M. (2021). Community-based interventions to reduce dental caries among 24-month old children: a pilot study of a field trial. *BMC Oral Health, 21*(1), 1-12.
- Fontana, M., & Gonzalez-Cabezas, C. (2019). Evidence-based dentistry caries risk assessment and disease management. *Dental Clinics, 63*(1), 119-128.
- Gannam, C. V., Chin, K. L., & Gandhi, R. P. (2018). Caries risk assessment. *General Dentistry, 66*(6), 12-17.
- Humphreys, S. J. (2021). *Management of Children with Molar-Incisor-Hypomineralisation*. The University of Liverpool (United Kingdom),
- Knapp, R., Marshman, Z., Gilchrist, F., & Rodd, H. (2021). The impact of dental caries and its treatment under general anaesthetic on children and their families. *European Archives of Paediatric Dentistry, 22*(4), 567-574.
- Kumar, S., Haque, M., Shetty, A., Acharya, J., Kumar, M., Sinha, V. K., . . . Godman, B. (2021). Current management of children with COVID-19 in hospitals in India; Pilot study and findings. *Advances in Human Biology*.
- Lamba, G., Nagpal, D. I., Chowdhari, P., Hotwani, K., & Gunwal, M. K. (2021). Oral Healthcare Management of Children after COVID-19 Outbreak. *International Journal of Clinical Pediatric Dentistry, 14*(2), 293.
- Lee, J., Schroth, R., & Lawrence, H. (2022). Nishtam Niwiipitan (My First Teeth): Oral Health Digital Stories from Urban Indigenous Parents. *JDR Clinical & Translational Research, 23800844221117143*.
- Li, Y., Deng, H., Wang, H., Abbey, C., Zheng, Y., Chen, J., . . . Chu, J. (2022). Building the mental health management system for children post COVID-19 pandemic: an urgent focus in China. *European child & adolescent psychiatry, 31*(7), 1-4.
- Malik, S. (2022). Role of Implementing Strategies of Expanded Core Curriculum for Effective Orientation and Mobility Practices from Perspectives of Parents and Teachers of Visually Impaired Learners in Pakistan. *Research Journal of Social Sciences and Economics Review, 3*(3), 1-9.
- McKenzie, H., Hayes, L., Acret, L., Boustany, C., Kim, B., Fethney, J., . . . Cook, N. (2022). Patient perceptions of a community-based intervention designed to provide support post administration of anti-cancer systemic treatments: A qualitative evaluation. *European Journal of Oncology Nursing, 102148*.
- Miles, E., Stoker, J., Senehi, N., Ash, J., Schlueter, L., Baumann, C., & Barney, J. (2021). Suspension and expulsion in Colorado early care and education settings: Child, program, and community-level predictors. *Infant Mental Health Journal, 42*(6), 767-783.
- Munblit, D., Sigfrid, L., & Warner, J. O. (2021). Setting priorities to address research gaps in long-term COVID-19 outcomes in children. *JAMA pediatrics, 175*(11), 1095-1096.
- Naidu, R. S., Nunn, J. H., Pahal, B., & Niederman, R. (2021). Promoting Oral Health in Early Childhood: The Role of the Family, Community and Health System in Developing Strategies for Prevention and Management of ECC. *Frontiers in Public Health, 9*.
- Pereira, L. F., de Deus Moura Lima, M., de Moura, M. S., Nogueira, N. G., Lima, C. C. B., & de Fátima Almeida Deus Moura, L. (2022). Does outpatient dental treatment have impact on the quality of life of children with early childhood caries? *Clinical Oral Investigations, 26*(2), 1605-1612.
- Prabhu, S., & PS, N. (2022). Novel SHP-ECC Mechanism Architecture for Attack Node Mitigation and to Predict Future Community Intrusions. *International Journal of Applied Engineering and Management Letters (IJAEML), ISSN, 2581-7000*.
- Pratamawari, D. N. P., Atikasari, D., & Bramantoro, T. (2022). The Effect of Parents' Socioeconomic Factors on Their Willingness to Take Care of Their Children's Oral Health in Early Childhood. *Journal of International Dental and Medical Research, 15*(2), 845-849.
- Rahman, M. S.-U.-, Simmons, D., Shone, M. C., & Ratna, N. N. (2022). Social and cultural capitals in tourism resource governance: The essential lenses for community focussed co-management. *Journal of Sustainable Tourism, 30*(11), 2665-2685.
- Reich, E., Lussi, A., & Newbrun, E. (1999). Caries-risk assessment. *International dental journal, 49*(1), 15-26.

- Saikia, A., Aarathi, J., Muthu, M., Patil, S. S., Anthonappa, R. P., Walia, T., . . . Dominguez, M. (2022). Sustainable development goals and ending ECC as a public health crisis. *Frontiers in Public Health, 10*, 931243.
- Sithisettapong, T., Tasanarong, P., & Phantumvanit, P. (2021). Strategic Management of Early Childhood Caries in Thailand: A Critical Overview. *Frontiers in Public Health, 9*, 664541.
- Tinanoff, N., Baez, R. J., Diaz Guillory, C., Donly, K. J., Feldens, C. A., McGrath, C., . . . Sharkov, N. (2019). Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: Global perspective. *International journal of paediatric dentistry, 29*(3), 238-248.
- Tušek, I., O'rourke, B., Lekić, C., Tušek, J., & Tušek, B. (2020). Early childhood caries in multilingual community. *Central European Journal of Public Health, 28*(4), 286-291.
- Verbrugge, E. (2022). An Overlooked Epidemic: Pediatric Oral Health Concerns On the Rise in Rural Communities.
- Woodley, T. (2022). *Taking an Interdisciplinary Approach to Designing the Theoretical Part of a Level 5 Initial Teacher Education Programme Based on the 'Triple Professionalism' Concept, for Adult Community Learning Teachers in Essex*. UCL (University College London),
- Wu, J., Bian, J., Wan, H., Ma, Y., & Sun, X. (2021). Health risk assessment of groundwater nitrogen pollution in Songnen Plain. *Ecotoxicology and Environmental Safety, 207*, 111245.
- Yeo, A. N., & Lee, S. Y. (2022). Effect of dental caries management using 'CAMBRA-kids' mobile application for children under 5 years old. *International Journal of Dental Hygiene, 20*(3), 443-452.