# Expanding the Role of Pediatric Dietitians in Supporting Oral Health in Children with Congenital Heart Defects

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**Abstract**

Children with congenital heart defects (CHD) exhibit a higher prevalence of poor oral health compared to children without CHD. Dental caries and gingival disease increase the risk for bacterial infections that can result in infective endocarditis and delay surgical interventions. This review of literature demonstrates the relationship between poor oral health and CHD. Conventional programs aimed at enhancing oral health in healthy children and those with CHD have demonstrated variable and short-term success, partly due to lack of individual focus. Nutrition and food choices impact oral health, highlighting the need for additional support and guidance from registered dietitians. Pediatric Registered Dietitians (RDs) can promote oral health through screening, focused nutrition education and individualized goals to support optimal growth.

## Introduction

Children with congenital heart defects (CHD) exhibit a higher prevalence of poor oral health compared to children without CHD.[1-3] Dental caries and gingival disease increase the risk for bacterial infections that can result in infective endocarditis and delay cardiac surgical interventions. This risk is higher compared to healthy children without heart defects [14]. Conventional programs aimed at enhancing oral health in healthy children and those with CHD have demonstrated variable and short-term success: poor oral health continues to be a challenge in this patient populat7-9 Registered Dietitians (RD) can play a role in addressing this issue. By being better trained to identify oral health risk factors during their nutrition assessment and influencing diet and eating habits RDs can help reduce the risk that poor oral health poses on children with CHD. The aim of this literature review is to highlight how engaging dietitians in oral health screenings can contribute to primary prevention against dental caries by offering nutrition education and reinforcing oral health practices.

## Children with CHD have higher prevalence of poor oral health

Children with CHD have poor oral health compared to healthy children. Multiple prevalence studies looking at oral health in this patient population have yielded consistent findings: children with CHD have higher rates of dental caries. [1-3]

In a study that assessed plaque, gingivitis, and caries prevalence in a group of Scandanese children with congenital heart defects (CHD) compared to children without CHD [1]. They found that children with CHDs exhibited a disadvantaged status concerning the examined oral health indicators. Sethi et al.[2] investigated the oral health, hygiene status and prevalence of dental anomalies in children with CHD. The study revealed caries prevalence of 56.7% in the CHD group, evenly distributed between both genders. Given the susceptibility of children with CHD

to develop infective endocarditis (IE), the study emphasized the significance of addressing poor oral hygiene, as it serves as a risk factor for IE development. This risk is particularly pertinent during dental procedures, where transient bacteremia may occur spontaneously.

In an epidemiological study to assess the prevalence of caries in children with CHD compared to counterparts, Koerdt S et al.[3] revealed that 62% of children with CHD exhibited no caries and demonstrated excellent oral hygiene. However, 38% of them displayed at least one dental lesion, and 37% showed an increased decayed, missing, and filled primary teeth ( DMFT) value of 2 or greater. The study underscored a significantly higher prevalence of caries and poorer oral hygiene among children with CHD. Overall, these studies underscore the importance of addressing poor oral health in children with CHD. Not only are they in a more disadvantaged position given their cardiac history, but also these oral health risk factors and associated complications pose a continuous threat to their overall well-being. This justifies the need for extra support from the entire medical health team to enhance their oral health outcomes.

**Why children with CHD have higher prevalence of poor oral health**

The knowledge-behavior-attitude framework can be used to better understand why poor oral health is so prevalent in children with CHD. Research has found that some families with children who have CHD lack knowledge and awareness regarding their child's oral health. Owen et al.[4] conducted a qualitative study to look at data on preventative advice given to parents of children with congenital heart disease. They found that parental awareness of oral health and priority of child's heart conditions greatly affected whether parents found themselves in a position to follow and understand health advice. Findings were divided into three main themes. First, improving oral health was important to participants. Parents had knowledge of oral health that was not obtained from health care professionals, but rather through sources on the internet.

Second, participants prioritized their child's heart condition over oral health. Information overload and lack of comprehension of complex medical information were barriers to thinking about oral health. Despite being seen by many health care professionals, participants reported feeling that the care between neonatologists, cardiologists, and other healthcare providers was disjointed. Third, there was inconsistency in health messaging provided to participants regarding their child's health status, particularly related to weight gain. Participants reported receiving advice from dietitians to help promote weight gain, enabling further treatment. They felt that a major consequence of assisting their child in gaining weight was the potential risk to oral health posed by recommendations such as allowing children to eat whatever they want, offering small frequent meals, and encouraging frequent consumption of carbohydrate-rich foods.

To better understand dental health and disease awareness, Koerdt et al[5] conducted a study to assess preventative measures taken to improve dental health in children with CHD. In terms of education, the majority (73%) of patients reported that their cardiologist had not mentioned oral health at the time of first diagnosis. Half of participating parents did not know the relationship between oral health and cardiac disease, and reported feeling that oral health was not especially important for their child.

Decreased brushing and increased consumption of cariogenic foods are among the most common behaviors observed in children with CHD that contribute to poor oral health.[6,7] Karikoski et al.[6] looked at oral health behavior in early childhood in children with major CHD, and explored how parental oral health behavior might be associated with childhood behavior. Tooth brushing twice a day and using fluoride toothpaste twice a day were less common in children with CHD. Children with CHD more commonly consume non-water beverages. Additionally, a correlation was found between parental and child oral health behavior. Parents

who brushed their own teeth twice a day also brushed their children's teeth twice a day more regularly. In another study[7] comparing oral health and nutritional behavior in healthy children and those with CHD, researchers found supporting data: children with CHD brushed their teeth less often and had higher daily consumption of cariogenic foods. The major findings from the research indicate a significant gap in knowledge and awareness regarding oral health among families with children who have congenital heart disease (CHD).

**Interventions aimed at addressing poor oral health in children with CHD**

Educational programs and intervention efforts have aimed to improve oral health promoting knowledge and behavior in both parents and children. Nelly Schulz-Weidner et al. [7] implemented a preventative oral hygiene program with three components that included (1) oral hygiene demonstrations and motivation, (2) tooth brushing and healthy nutrition, and (3) a dental visit. At first follow up, CHD children had significantly poorer oral hygiene. Throughout the intervention program, all oral hygiene parameters of the CHD group improved. This study demonstrated that interdisciplinary care among pediatric cardiologists and dentists with structured preventative oral hygiene programs can significantly improve oral health status of children with CHD. Sivertein et al.[8] evaluated effectiveness of an oral health care program among children with CHD in earlier childhood, from infancy to 5 years of age. The intervention consisted of a "knowledge pack" that addressed knowledge gaps (oral health knowledge and instructions, dietary counseling) and interventions such as fluoride supplementation. In contrast to findings by Nelly Schulz-Weidner et al, this intervention program was not successful at influencing caries or dental erosion prevalence in children with CHD. However, findings revealed improved oral hygiene, reduced gingival bleeding and less untreated dental caries in the intervention group.

Karikoski et al. [10] looked at parental perception and experiences of an early oral health promotion intervention targeting children with major CHD and at risk for developing endocarditis later in life. The intervention program included a combination of face-to-face and phone call health promotion counseling in four stages. Participants were delivered toothbrushes, toothpaste, and written information at each stage. Results revealed that parental experience of the intervention was overall positive. Notably, parents felt that it was a feasible program in which to participate. The timing of first contact and web-based support were two points of feedback to consider for future intervention programs. Individual oral support was much appreciated by participating parents.

Educational programs to support oral health have targeted oral health promoting behaviors such as increasing brushing, use of fluoridated toothpaste, and consistency of oral health visits.[7-9] Some interventions have been successful in improving outcomes, while others have not. [7-9] Exploring and evaluating parental perceptions and experiences with existing programs can provide useful insight for improving interventions that target oral health risk factors in children with CHD. [10] One way to make interventions more successful is by involving other health care professsionals alongside dentists.[12] Dietitians are well-positioned to be a part of the solution because they cannot only provide nutrition education but offer more individualized approaches to modifying dietary behaviors that contribute to development dental caries.[14]

**The role of the Registered Dietitian in improving oral health in children with CHD**

Nutrition challenges and undernutrition are common in CHD patients.[11,12] Nutrition is critical in the connection between oral health and CHD because early childhood caries (ECC) have a strong feeding and dietary component.[13] Poor nutritional status results in growth restriction, which is correlated with delayed surgical interventions, increased morbidity, and

increased neurological development.[15] Both perioperative and postoperative periods are critical for assessing and optimizing nutritional status. Determinants of nutritional status among this population include poor oral intake (feeding difficulties, insufficient enteral delivery), and increased energy expenditure, delivery route, nutritional composition of enteral feeds.[15]

One of the biggest nutrition-related risk factors in this patient population is the high prevalence of oral aversion in infancy.[11] Oral aversions are common among CHD patients because they experience known risk factors such as early life pain experiences, intubation, scheduled feeding without regard to hunger cues, and long-term use of feeding tubes.[11] Oral aversions have implications for nutritional status but also for oral health promoting behaviors – for example avoiding brushing due to pain.

RDs can play a role in improving oral health in CHD patients. Previous research has suggested that populations-based models that includes more unconventional providers such as RDS can help efforts to minimize Early Childhood Carries.[12] ECC has a strong feeding and dietary component, which makes dietitians well-positioned to help dentists in assisting families in adopting oral health promoting practices.

Despite the large area of opportunity for RDs to be involved, there are only a few tools that have been developed to help providers other than dentists quickly and efficiently assess dietary habits to identify nutritional risk for dental carries. In effort to address this gap, Patenaude et al[13] developed a validated nutrition questionnaire for assessing dental caries risk in Canadian college-aged individuals. Dietitians can provide primary prevention against dental caries through nutrition education and reinforcing oral health practices. As integral members of the healthcare team, pediatric dietitians can support significant health outcomes by including oral health screening as part of their assessment.

Nutrition challenges and undernutrition are common among patients with congenital heart defect (CHD), with poor nutritional status leading to growth restriction and correlated delays in surgical interventions and increased morbidity. However, there is a lack of efficient tools for non-dental healthcare providers to assess dietary habits and identify nutritional risks for dental caries. Efforts are being made to address this gap, highlighting the potential for RDs to contribute significantly to both nutrition and oral health outcomes in this population.

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