Caregiver Factors Related to Early Childhood Caries in Immigrant Families

in a Nurse-Managed Clinic

**Abstract**

Dental caries are a significant problem for uninsured immigrants and can be linked to serious health issues. The purpose of this study was to determine current knowledge, values, and practices related to pediatric dental health care among Central American immigrants. A non-experimental causal-comparative study was conducted in a nurse-managed primary care clinic serving indigent and uninsured families. The results showed that 58% of the children of the caregivers who participated in this study have early childhood caries. An intervention aimed at overcoming the identified barriers to reduce the incidence of caries in an uninsured immigrant population could help reduce disparities and improve outcomes.

Early childhood caries (ECC) are a serious dental health problem that affect large numbers of toddlers and pre-school children and disproportionately impact uninsured immigrant children. Pain from caries can interfere with sleep, eating patterns, and nutrition status, and fractured teeth from severe caries can cause speech problems and reduce self-esteem (Marshall, 2005). In addition, caries are sometimes linked to serious health issues and have caused death (Genshan, 2008). Little is known about the reasons for the poor state of health of many immigrant children’s teeth. In order to develop appropriate interventions, a better understanding of the factors related to current oral health practices in immigrant families is needed.

**Purpose**

The purpose of this study was to determine current knowledge, values, and practices related to pediatric dental health care practices among Central American immigrants in order to better understand why children from immigrant families have significant tooth decay. Once the reasons behind lack of appropriate oral care are understood, interventions aimed at overcoming the barriers can be developed.

Tooth decay is a preventable bacterial infection that is the most common chronic disease in children, and many school days are lost due to dental issues (National Institute, 2000; Pierce, Rozier, & Vann, 2002). By increasing parent knowledge about the importance of oral hygiene and prevention of early childhood caries, this study seeks to use evidence-based practice to improve dental health and reduce the incidence of early childhood caries in uninsured immigrant populations.

Review of the literature

Dental care has improved dramatically in the past several decades due to fluoridation of community water and advances in dentistry technology, but not all segments of society benefit equally. There is a paucity of literature devoted to identifying the prevalence of ECC, but according to the most recent report by the Centers for Disease Control and Prevention (Dye et al., 2007), cavities have increased in toddlers and preschoolers. According to the report, cavities in children ages two to five years increased from 24 percent to 28 percent between 1988-1994 and 1999-2004, while Pierce, Rozier, and Vann (2002) report that with 40% of preschool children experiencing one or more caries, ECC has reached epidemic proportions. There are many disparities in oral health among children and adults, and Latino children experience a higher prevalence of caries than children in any other racial or ethnic group in the United States (National Institute, 2000; Barker & Horton, 2008).

Healthcare providers who care for children are in an ideal position to provide oral hygiene counseling and anticipatory guidance during well child visits. The third edition of the *Bright Futures* guidelines reports finding no controlled trials that examined the ability of primary care clinicians to identify children who displayed risk factors for oral disease (Hagan, Shaw, & Duncan, 2008). Increasing numbers of undocumented immigrants without access to government services, increasing prevalence of early childhood caries among Latino children, and a lack of documentation about caregiver beliefs about oral hygiene practices demonstrate the need for research in this area. However, the Surgeon General’s 2000 report on oral health in America states on page eight “there is a gap between research findings and the oral disease prevention and health promotion practices and knowledge of the public and the health professions” (National Institute, 2000). While the causes of caries are multifactorial, Genshan reports that 33% of the population of the United States (US) still lacks fluoridation in community water supplies (2008). The percentage is likely higher for immigrants arriving from poor rural countries in Central America. Many recent immigrants report not having running water in the homes they left, so children did not have the benefit of fluoridated water during prenatal development or early childhood. Little is known about the prenatal care received by mothers of immigrant children, or the priority those mothers or other caregivers place on oral hygiene.

The Hispanic population is not only the fastest growing segment of American society, it has become the largest minority group in the US. Key findings from an analysis of the Pew Hispanic Center report state that “unauthorized immigrants living in the US are more geographically dispersed than in the past and are more likely than either US-born residents or legal immigrants to live in a household with a spouse and children. In addition, a growing percentage of the children of unauthorized immigrant parents - 73% - were born in this country and are US citizens” (Passel & Cohn, 2009, p.1). Additional information is needed to design educational interventions to meet the needs of this vulnerable population.

Significance

Oral health is an important part of early childhood development. Nurses, nurse practitioners, health educators, and other professionals working with vulnerable populations are in an ideal position to provide preventive anticipatory guidance about oral hygiene and to identify and refer children with existing caries. A review of the literature demonstrated the magnitude of the problem of ECC among US residents, however, less is known about the issue in recent immigrants, or about health education aimed at preventing or stopping the progression of ECC. Caries are often first noted by a primary care provider during routine visits. Children visit primary care providers more often than dentists, but little information exists in the literature aimed at primary care providers. Uninsured, poor, and undocumented immigrant young children are a vulnerable population, and that vulnerability is compounded by language barriers and barriers to access to care by families who are ineligible for government services.

**Methods**

At the time of this study, the Nurse-Managed Clinic Network provided basic primary care to underserved residents of northern Virginia. Clients were primarily low-income members of minority groups who did not have health insurance. Many were undocumented immigrants from Mexico or Central America who did not have access to government services such as low-cost health care or low-cost dental care. The clinics provided walk-in ambulatory care for minor illness and well visits, and were not a medical home for clients. The study was conducted using a causal-comparative approach on a sample of convenience in a nurse-managed primary care clinic serving uninsured families. The Institutional Review Board of Old Dominion University approved the study.

Inclusionary criteria for participation included being aged 21 years or older, conversant in or able to read Spanish or English with cognitive abilities to provide informed consent, and the parent or primary caregiver of a child aged seven years or less.

Participation took place during a routine visit to the nurse-managed clinic where it is a standard of care for the nurse practitioner to conduct an oral exam on pediatric patients. Informed consent was obtained, the surveys were distributed and completed in the waiting area, and chart review was conducted to group participants.

Instrument

A researcher-developed tool was used, and provided in both English and Spanish. A panel of experts reviewed the tool for content and face validity. Instrument reviewers determined the tool to be at the sixth grade reading level.

The first 12 items on the tool focus on demographic data, and include items such as gender, age, country of origin, and language spoken at home. Responses were coded for simplification of data entry, and not linked to identifying data. The remaining 38 items focused on the parent’s dental health, the child’s dental health, the parent's knowledge about oral health care, and the importance of primary dentition. Items also addressed the likelihood that the parent would seek dental care for their child.

Sample

There were 72 participants, with 42 (58.3%) placed in Group One, parents of children with ECC as evidenced by white spot lesions, caries, or gingivitis on an oral exam. Thirty parents of children without evidence of ECC (41.7%) were placed in Group Two. Demographic data for all participants are listed in Table 1.

El Salvador was the country represented most frequently with 41 participants (56.9%) and Honduras was second with 17 participants (23.6%). The mean age of study participants was 30 years, with 56 female participants (77.8%). Single parents comprised 58.3% (42) of the sample. Twenty-five percent of the participants self-reported as US citizens, 23.6% reported they were legal residents, 30.6% stated they were undocumented aliens, and 20.8% declined to answer the question. The parent’s or caregiver’s length of residence in the US ranged from 6 days to 39 years. Fifty percent of the participants reported that they had been US residents for five years or less. Only 15 subjects (21%) reported completing high school or education beyond high school.

The mean annual income reported was $23,353, but 53% of the participants did not answer the question on income. Many of the participants had limited English proficiency, but the range of ability was varied with 89% of the participants reporting that Spanish was spoken at home.

**Results**

Variables pertaining to caregiver knowledge about oral hygiene practices were analyzed using the Mann Whitney *U* test, and none demonstrated a statistically significant between-group difference. Caregivers were asked to rank their responses to questions related to their beliefs about oral hygiene on a five-point scale ranging from not important to very important. There were no differences found when analyzing beliefs about the age when oral hygiene should begin, seeing a dentist regularly, or using fluoride to prevent cavities.

While not statistically significant (p = 0.058), the data highlight an important area of concern between caregivers who believe it is important to have cavities treated in baby teeth. Results of the Mann Whitney *U* test analyzing caregiver knowledge are displayed in Table 2.

Six variables provided data about bottle feeding beliefs. Participants were asked to choose all that applied from a list of possible causes of cavities. Caregivers who selected bottle feeding, bottle feeding beyond one year of age, and taking a bottle to bed as causes of cavities did not differ between groups. Overall, only 17% of caregivers believed baby bottles contribute to cavity development. No difference was found between the groups as tested by the chi-square test. Results for between-group differences in beliefs about bottle-feeding are displayed in Tables 3 and 4.

The Mann Whitney *U* test was used to analyze the likelihood caregivers will take their child to the dentist in the next six months. Caregivers selected likelihood of seeking dental care within six month on a five-point scale ranging from very likely to very unlikely. The *U* statistic showed no significant difference between the two groups, and a similar lack of significance was found when analyzing the between-group difference for the likelihood of the caregiver to follow up on the referral to a free dental hygiene clinic received at the time the survey was completed. The results of the analysis of the between-group difference are displayed in Table 5.

Eleven percent of participants were from Mexico, 56.9% from El Salvador, 23.6% from Honduras, 4.2% from Nicaragua, 2.8% from Panama, 1.4% from Costa Rica, and none from Guatemala or Belize. While 58.3% of the sample had children with ECC, 64.7% of those from El Salvador and 71% of those from Honduras had children in the ECC group. However, the between-group difference for the presence or absence of ECC based on country of origin was not statistically significant at p<0.05 as tested by the chi-square test. The demographics for country of origin compared with presence or absence of caries are displayed in Table 1.

**Discussion**

Possible limitations of this study are the small sample size, and the use of a sample of convenience due to possible sample homogeneity. In addition, the lack of between-group differences may be due to an error in instrument clarity. Although the parents represent a variety of Central American nations, many have a shared experience of immigrating to the US and living among each other in similar circumstances with and a common language, possibly creating a homogenous population. Previous studies have shown that nativity and citizenship plays a strong role in children’s health care access (Huang, Yu, & Ledsky, 2006). The self-reporting of immigration status in a time of increased immigration policy enforcement likely presents a false picture of the level of legal aliens and naturalized citizens in the sample. Regardless of nativity or citizenship, the results demonstrate that parents who believe it is important to clean a baby’s mouth before the baby has any teeth were more likely to have children who did not have early childhood caries. While not statistically significant in this population (p = 0.08), an opportunity for parent education about oral hygiene may impact future development of ECC. Beliefs about bottle feeding are difficult to determine in a limited-response survey. Participants were asked to choose all that applied from a list of possible causes of cavities that included eating sweets, baby bottles, thumb sucking, breastfeeding, bad genes, bacteria, and poor oral hygiene. Caregivers who selected bottle feeding, bottle feeding beyond one year of age, or taking a bottle to bed as causes of cavities did not differ between groups as tested by the chi-square test, but a possible measurement error with this list of nominal data may have occurred because although participants were asked to choose all that apply, many participants selected only one item in the list. The results were suggestive, but still not significant, when caregivers were asked if using either a bottle of milk or a bottle of juice in bed causes cavities. The results demonstrate that parents who believe it is acceptable practice for an infant to take a bottle of juice to bed were more likely to have children who were diagnosed with early childhood caries, though not at a level that was statistically significant. A between-group difference was identified for beliefs about using a bottle as a comfort tool while a baby is teething, but it was not a statistically significant difference. The findings provide evidence that caregivers from both groups could benefit from education about primary dentition.

Another lack of significance was found when analyzing the between-group difference for the likelihood of the caregiver to follow up on the referral to a free dental hygiene clinic received at the time the survey was completed. Several potential reasons exist for the lack of between-group difference, and the researcher believes response-set bias may play a role in the lack of difference due to parents choosing to provide socially desirable answers to the questions.

Overall, 41% of parents did not know if any of their children had cavities. This is an interesting finding because 72% of parents of children with ECC said they did not know if their children had caries, where only 28% of parents in Group Two did not know about the presence of caries in any of their children. While not a variable being investigated in this study, the between-group difference is significant (2 10.291, p 0.006), and should be further analyzed in a future study.

Another important finding is the caregivers’ beliefs about fluoride. Thirty-eight percent of all participants believe fluoride helps a lot to prevent cavities, 21% believe fluoride helps somewhat, and 31% were unsure if fluoride helps prevent cavities. Overall, more than one-third of the sample (37%) were either unsure or do not believe fluoride plays a role in cavity prevention. In a related finding, 61% of parents believe children should drink non-fluoridated bottled water. While beliefs about bottled water do not differ significantly between the two groups (2 4.016, p 0.136), the findings suggest a learning need exists in this population about the importance of fluoride.

Parents who supervise their children’s oral hygiene routine were less likely to have children with ECC (2 5.072, p 0.08), with 62% of caregivers who reported supervising tooth-brushing having children without ECC. It is interesting to note that 71% of parents in the ECC group declined to answer the question about supervision.

No between-groups differences were found based on country of origin. Either no difference exists, or the small sample size or development of homogeneity of the group during the acculturation process in the US may have impacted the findings. Recommendations for future study include collecting data about the presence of ECC based on nativity when comparing children born to parents who were born in the US compared to parents born outside the US.

The language spoken at home contributed significantly to this issue. While only eight participants (11%) spoke English at home, 88% of the English speakers had children without evidence of ECC, further demonstrating the need for culturally and linguistically appropriate anticipatory guidance. Sixty-four percent of those in Spanish-speaking homes had children with ECC (2 7.779, p = 0.005).

Many participants had difficulty answering the questions and requested interpretation from the researcher or left questions unanswered if they did not understand what was being asked. The survey was written at a sixth grade reading level, but will require further simplification if used again for this population.

Overall, 58% of the children of the caregivers who participated in this study have early childhood caries, and 45% of parents in the ECC group reported they were likely to follow-up on a referral for a free dental hygiene visit or to see a dentist in the next six months. Kagihara, Niederhauser, and Stark report that dental caries is a preventable and reversible infectious disease, and further state that child health providers have multiple opportunities to provide oral health care and anticipatory guidance with hygiene counseling during numerous well-child visits in the pre-school years (2009). The American Academy of Pediatrics suggests that dental caries counseling should be targeted at high-risk children and families (2003). Other studies have demonstrated that lack of access is a barrier to care, but lack of knowledge is also an important issue to address (Schroth, Brothwell, & Moffatt, 2007; Healthy People 2020, 2013). The data from this study suggest that additional effort is warranted to ensure that all children receive recommended oral examinations and dental care, and all parents receive anticipatory guidance for caries prevention.

**Conclusions**

Recommendations for future study include repeating the current study with a larger sample size and more diverse population, and with a modified tool using fewer questions, a simpler response set, and written at a lower reading level. Additional recommendations include development of a culturally- and linguistically-appropriate program for parent education to address appropriate oral hygiene at various developmental stages, the importance of parental supervision of tooth cleaning, appropriate use of baby bottles to include timing of weaning, use of bottles by a sleeping baby, and bottle contents, as well as the importance of preventive dental care and fluoride prophylaxis.

This study failed to confirm a strong relationship between several areas of caregiver knowledge and the presence of ECC, but it is important to note that there are a number of possible reasons for this. The naturalization process for adult immigrants often spans five to ten years, so noncitizen parents of US-born children have likely been in the country a short period of time, so the family’s level of acculturation may be low, and the family may be linguistically isolated. The similarity in both groups’ responses does not assume there is a shared Latino culture, but rather reflects a relative lack of socioeconomic differentiation among uninsured immigrants. In addition, parents and caregivers who are undocumented immigrants may fear that contact with the healthcare system could jeopardize their status, so may avoid preventive care. Parents who visit a free clinic that asks no questions about residency status are in an ideal position to receive information on how to care for their families’ health, as well as how to navigate the American healthcare system. The evidence-based practice question for this study asked if caregiver knowledge about tooth care is a determinant of early childhood caries. While this study did not find significant differentiation among caregiver knowledge, the findings of this study suggest areas where anticipatory guidance can make a difference in oral health outcomes. Parents can be taught the importance of infant mouth care, and can be taught about the damaging tooth effects related to long-term baby bottle use.

The data collection portion of this study demonstrated that dental screenings can be easily incorporated into routine pediatric primary care, suggesting that primary care providers can significantly contribute to the general health status of children through early identification of children who need dental care and provision of anticipatory guidance to parents and young children. Nurse practitioners are in an ideal position to perform early oral health screenings and to provide patient education on how to care for primary and permanent teeth, as well as the benefits of routine preventative and restorative dental care.

According to Macek, Heller, Selwitz, & Manz (2004), 70 percent of all cavities in children between the ages of two and five years involve only eight percent of that population. One of the Healthy People 2020 health goals is implementation of clinical prevention activities, and the US Preventive Services Task Force issued a recommendation that primary care providers prescribe fluoride supplementation at the appropriate dose for any child over six months of age whose water source is deficient in fluoride (Agency for Healthcare Research and Quality, 2008). The National Guideline Clearinghouse recommends that primary care professionals provide education about ECC, that every infant receive an oral health risk assessment by six months of age, and that a dental home be established for infants by 12 months of age (2011), and the American Academy of Pediatric Dentistry makes several recommendations for the prevention of ECC (2011). A nurse-led health promotion program that includes a baseline assessment of oral health and anticipatory guidance for caregivers can determine if fluoride supplementation is necessary and educate parents about prevention strategies. In addition, the possibility of topical fluoride prophylaxis at the time of an oral exam in a primary care setting should be explored. Hall and Hall (2013) discussed dental care education, and advocate for the use of topical fluoride application in primary care.

Advanced practice nurses are academically and experientially prepared to design therapeutic interventions based on nursing science and other sciences. The addition of a health promotion counselor/health educator would create an ideal team environment to implement a therapeutic intervention aimed at reducing ECC. The results of the study reveal several areas where parents could benefit from education about oral hygiene and ECC prevention. Specifically, a program should focus on how to care for children’s teeth, how often oral hygiene should be performed and at what age it should be started, the importance of parental encouragement and supervision, use of fluoridated water or fluoride supplementation, and appropriate use of baby bottles. Nurse practitioners are in a prime position to readily integrate oral exams in primary care routines. A caries risk assessment and educational intervention can be incorporated into routine primary care for both well and sick children. Appropriate oral hygiene education, referrals for professional dental care, prescriptions for fluoride supplementation in areas without fluoride in the local water supply, and application of topical fluoride varnish, which can decrease the risk of decay and slow progression of existing disease (Hall & Hall, 2013), are all interventions easily integrated in any primary care visit with a child, no matter the reason for the visit.

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Tables

**Table 1.** Demographic Data for Participants by Comparison Group

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Demographics** | **Group One (n=42)**  **Children with Caries** | | **Group Two (n=30)**  **Children without Caries** | |
|  | **N** | **%** | **N** | **%** |
| Country of Origin |  | | | |
| Mexico | 3 | 4.2 | 5 | 6.9 |
| El Salvador | 24 | 33.3 | 17 | 23.6 |
| Guatemala | 1 | 1.4 | 1 | 1.4 |
| Honduras | 11 | 15.3 | 6 | 8.3 |
| Nicaragua | 2 | 2.8 | 1 | 1.4 |
| Costa Rica | 1 | 1.4 | 0 | 0 |
| Gender |  | | | |
| Male | 10 | 13.9 | 4 | 5.6 |
| Female | 30 | 41.7 | 26 | 36.1 |
| Marital status |  | | | |
| Married | 7 | 9.7 | 7 | 9.7 |
| Single | 27 | 37.5 | 15 | 20.8 |
| Cohabitation partner | 6 | 8.3 | 0 | 0 |
| Parent immigration status |  | | | |
| US citizen | 11 | 15.3 | 7 | 9.7 |
| Legal resident alien | 13 | 18.1 | 4 | 5.6 |
| Undocumented alien | 11 | 15.3 | 11 | 15.3 |
| No response given | 7 | 9.7 | 8 | 11.1 |
| Language spoken at home |  | | | |
| Spanish | 41 | 56.9 | 23 | 31.9 |
| English | 1 | 1.4 | 7 | 9.7 |
|  | **Mean** | **Range** | **Mean** | **Range** |
| Age | 31 | 18-54 | 29 | 18-42 |
| Length of US residency | 6 yrs | 6 days-20 yrs | 9.5 yrs | 1 wk-39 yrs |
| Education | 8 yrs | 0-12 yrs | 8.1 yrs | 0-17 yrs |
| Annual income | $25,557 | $0-75,000 | $29,200 | $0-92,000 |
| Number of children | 1.9 | 1-8 | 2.5 | 1-6 |
| Number of children <7 years | 1.9 | 1-4 | 1.8 | 1-4 |

**Table 2**. Differences between caregiver knowledge and the presence or absence of caries (Q1).

|  |  |  |  |
| --- | --- | --- | --- |
| **Knowledge** | **Group One**  **(No cavities)**  **X           (n)** | **Group Two**  **(Cavities)**  **X        (n)** | **Mann Whitney *U***  **p-value (between)** |
| Have cavities treated in baby teeth | 40.23 (42) | 31.28 (30) | 0.058 |
|  | | | |
| Brush/clean baby’s gums | 33.07 (42) | 41.30 (30) | 0.080 |
|  | | | |
| Clean the mouth of infants before teeth erupt | 35.01 (42) | 38.58 (30) | 0.449 |
|  | | | |
| See a dentist regularly | 36.57 (42) | 36.40 (30) | 0.968 |
|  | | | |
| Use fluoride to prevent tooth decay | 33.82 (42) | 40.25 (30) | 0.178 |
|  | | | |
| Not brushing teeth causes cavities | 33.06 (42) | 41.32 (30) | 0.057 |
|  | | | |
| Poor oral hygiene causes cavities | 33.85 (42) | 40.22 (30) | 0.124 |
|  | | | |
| Age should tooth-brushing begin | 36.48 (42) | 36.53 (30) | 0.991 |
|  | | | |

**Table 3.** Between-group differences in beliefs about the duration of bottle feeding

|  |  |  |  |
| --- | --- | --- | --- |
| **Beliefs about bottle feeding (yes/no)** | **% answering No** | | ****2 value (p)** |
|  | **Group One** | **Group Two** |  |
| Baby bottles cause cavities | 83% | 70% | 1.886 (0.390) |
| Bottle feeding after one year causes cavities | 91% | 83% | 0.908 (0.635) |
| Taking a bottle to bed causes cavities | 88% | 73% | 2.585 (0.275) |
|  | | | |

**Table 4.** Between-group differences in beliefs about bottle feeding

|  |  |  |  |
| --- | --- | --- | --- |
| **Beliefs** | **Group One**  **(No cavities)**  **X           (n)** | **Group Two**  **(Cavities)**  **X        (n)** | **Mann Whitney *U***  **p-value (between)** |
| OK for babies to go to bed with a bottle of milk | 35.94 (42) | 37.28 (30) | 0.781 |
|  | | | |
| OK for babies to go to bed with a bottle of juice | 38.60 (42) | 33.57 (30) | 0.297 |
|  | | | |
| Frequently drinking soda is OK for a child’s teeth | 37.29 (42) | 35.40 (30) | 0.692 |
|  | | | |
| A baby bottle is a good comfort tool for teething | 34.89 (42) | 38.75 (30) | 0.417 |
|  | | | |

**Table 5.** Between-group differences in likelihood of seeking dental care

|  |  |  |  |
| --- | --- | --- | --- |
| **Likelihood** | **Group One**  **(No cavities)**  **X           (n)** | **Group Two**  **(Cavities)**  **X        (n)** | **Mann Whitney *U***  **p-value (between)** |
| Likelihood of seeking dental care within 6 months | 34.42 (42) | 39.42 (30) | 0.299 |
|  | | | |
| Likelihood of follow-up on dental clinical referral | 38.92 (42) | 33.12 (30) | 0.219 |
|  | | | |