Dental Care Utilization for Children with Special Health Care Needs in Washington State's Access to Baby and Child Dentistry Program

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Abstract

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Objectives: To identify potential disparities affecting young children with special health care needs (CSHCN) within public dental programs by evaluating preventive dental care utilization rates in Washington State's Access to Baby and Child Dentistry (ABCD) Program.

Methods: This is a cross-sectional analysis of 2012 Medicaid data from Washington state. The data was obtained from the Washington State Health Care Authority and included children under age six who were enrolled in the Medicaid program in 2012 for 11-12 months (N=206,488). Medical diagnosis codes (from hospital, inpatient, and outpatient data) and Medicaid eligibility files were used to determine each child's special needs status. The outcome was utilization of preventive dental services, as determined by Current Dental Terminology (CDT) codes. Modified Poisson regression was used to estimate both crude and adjusted prevalence rate ratios with 95% confidence intervals (CI). All analyses were conducted using Stata 13 for Windows (StataCorp LP, College Station, Texas, USA).

Results: There were 58,511 children determined to have SHCN (28.3%). A total of 114,570 children had at least one preventive dental visit in 2012 (55.5%). Age, SHCN status, Ethnicity, Race, and county Health Professional Shortage Area (HPSA) were statistical confounders and included in the adjusted Modified Poisson regression analysis. The adjusted analysis revealed CSHCN were 1.04 times more likely to utilize preventive dental care than their typically developing peers (95% CI: 1.03, 1.05, $p < 0.001$).

Other factors associated with increased likelihood of preventive dental care use included: Hispanic ethnicity, preventive medical care use, older age, and living in an area not classified as a Health Professional Shortage Area (HPSA) ($p < 0.001$ for all).

Conclusions: Medicaid-enrolled CSHCN in Washington state are slightly more likely to receive preventive dental services than children without SHCN. Other factors associated with increased likelihood that a child utilized preventive dental care included older age, having preventive medical care, not residing in a dental HPSA, and Hispanic ethnicity. Efforts from state organizations, providers, and aid groups can focus on ensuring that all children served by the ABCD program receive appropriate preventive dental care.

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To Drs. LuAnn Mercier and John Deviny who have taught me the power of public health in our community. Thank you for your mentorship and enthusiastic support!

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INTRODUCTION

The Maternal and Child Health Bureau (MCHB) defines children with special health care needs (CSHCN) as "those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally"(McPherson, Merle et al., 1998). According to the 2009-2010 National Survey of Children with Special Health Care Needs survey, 15% of U.S. children ages 0-5 years have special health care needs (SHCNs) (Data Resource Center for Child and Adolescent Health, n.d.). Nearly half of these children are low-income, commonly defined as living in a household with an annual income below 200% of the Federal Poverty Level (FPL) (Data Resource Center for Child and Adolescent Health, n.d.). From an ethical and health equity perspective, it is important to meet the oral health care needs of young children with special health care needs (CSHCN) from low-income households because these individuals present with multiple medical and social vulnerabilities (Treadwell & Northridge, 2007). In addition to the adverse outcomes associated with untreated tooth decay, including pain, infection, and problems learning that healthy children experience, poor oral health in CSHCN can lead to serious systemic complications including aspiration pneumonia, systemic infections, and hospitalization (Norwood & Slayton, 2013).

Oral Health of Young CSHCN

Young CSHCN are significantly more likely to experience tooth decay than healthy children and older CSHCN, regardless of type and severity of condition (Chen, Chen, Tsai, & Shih, 2014; Chi, Rossitch, & Beeles, 2013; Solanki et al., 2016). In their *Policy on Early Childhood Caries*, the American Academy of Pediatric Dentistry (AAPD) defines young children as those less than six years old (American Academy of Pediatric Dentistry, 2008). Young CSHCN are exposed to fermentable carbohydrates through intake of medications high in sugar (Donaldson, Goodchild, & Epstein, 2015; Foster & Fitzgerald, 2005). They may also have preferences for soft foods due to sensory processing issues or may be permitted to eat sweets frequently to promote weight gain or manage behaviors (Diolordi, DelBalzo, Bernabei, Vitello, & Donini, 2014; Mohinderpal Chadha, Kakodkar, Chaugule, & Nimbalker, 2012; Norwood & Slayton, 2013). In addition, low exposure to fluoridated toothpaste places

these children at high risk for dental decay, as does inconsistent home care (Huebner, Chi, Masterson, & Milgrom, 2014). CSHCN often rely on caregivers for routine oral hygiene and caregiver fatigue can influence the frequency and quality of oral hygiene for these children (Petrova, Hyman, Estrella, Inglehart, & Habil, 2014; Norwood & Slayton). Congenital conditions such as cleft lip and/or palate, dental crowding, decreased salivary flow, and enamel defects make keeping teeth clean and decay free more difficult (DeMattei, Cuvo, & Maurizio, 2007).

Dental Care Utilization for Young CSHCN

Preventive dental care visits are particularly important for young CSHCN. Young CSHCN who utilize preventive dental services have fewer unmet dental needs and better long-term oral health than those who do not (Chen, Chen, Tsai, & Shih, 2014; Van Cleave & Davis, 2008). However, young CSHCN face multiple unique barriers to receiving care. Behavioral difficulties, competing medical care needs, financial strain, and oral aversions all make dental care more difficult to access (American Academy of Pediatric Dentistry, 2012; Chi, McManus, & Carle, 2014; Lewis, Robertson, & Phelps, 2005; Nelson et al., 2011; Norwood & Slayton, 2013; Wiener, Vohra, Sambamoorthi, & Madhavan, 2016). Even if a family with a young CSHCN is motivated and able to seek dental care, they often have difficulty finding a dentist willing to see their child (American Academy of Pediatric Dentistry, 2012; DeMattei, Cuvo, & Maurizio, 2007; Nelson et al., 2011; Norwood & Slayton).

Studies vary in the reported rates at which CSHCN utilize dental care (Chi, Momany, Kuthy, Chalmers, & Damiano, 2010; Iida, Lewis, Zhou, Novak, & Grembowski, 2010). In general, young CSHCN are equally or more likely to use dental services than other children, which is often attributed to their early and extensive interface with the healthcare delivery system (Van Cleave & Davis, 2008; Iida et al.). Even so, they have higher rates of caries and more unmet dental needs than their peers and may be receiving mainly non-preventive services (Chen, Chen, Tsai, & Shih, 201; Chi, Rossitch, & Beeles, 2013; Iida et al.; Lewis, Robertson, & Phelps, 2005). In one telephone study of 38,966 CSHCN, dental care was the most significant unmet need with 78% of participating families reporting the need for dental care in the past 12 months (Lewis et al., 2005). Collectively, these data suggest higher rates of dental care utilization may not be sufficient to prevent disease in these high-risk children. This may be particularly true in low-income populations (Lewis, Robertson, & Phelps).

Oral Health Disparities in Young, Low-Income CSHCN

Young children from low-income families are also among those at highest risk for dental caries with two to three times the caries rate of more affluent children (Dye, Hsu, & Afful, 2015; U. S. Department of Health and Human Services, 2000). Few studies have looked at socioeconomic status (SES) and dental care utilization among young CSHCN. Some have found school-aged CSHCN of lower SES to have more reported unmet dental need than CSHCN of higher SES (Kane, Mosca, Zotti, & Schwalberg, 2008; McManus, Chi, & Carle, 2015). This finding mirrors the trends in dental disease for healthy children and can likely be generalized to young CSHCN.

High caries rates and low dental care utilization have been documented for young children in Medicaid, a publicly funded health insurance plan for low-income individuals (Brickhouse, Rozier, & Slade, 2008; Hamasha, Warren, Levy, Broffitt, & Kanellis, 2006). It was estimated that less than 50% of continuously enrolled Medicaid children under the age of five had a preventive dental visit in 2007 and in most states, fewer than 10% of children under age three had a preventive dental visit in that same year (Hakim, Babish, & Davis, 2012). Despite efforts through programs such as Medicaid, the prevalence of decay experience in young impoverished children is high and of great public health concern (American Academy of Pediatric Dentistry, 2008; Tomar & Reeve, 2009). Young age and Medicaid enrollment place many CSHCN at risk for poor oral health with tremendous barriers to dental care (Lewis, 2009).

The ABCD Program

The Access to Baby and Child Dentistry (ABCD) program is a statewide program in Washington state for Medicaid-enrolled children less than six years old aimed at increasing utilization of preventive dental care by young children. The program pays for frequent dental services, higher reimbursement rates for ABCD certified dentists, professional training for providers, and support services to participating families (Washington State Healthcare Authority, 2015; Kobayashi, Chi, Coldwell, Domoto, & Milgrom, 2005; Lewis, Robertson, & Phelps, 2005). It is available to all children under the age of six who are enrolled in the state Medicaid program, with no additional enrollment required. The ABCD program was rolled-out in select counties starting in 1995 and fully implemented statewide by 2013 (Washington State Healthcare Authority).

A number of studies have evaluated the ABCD program. A study of 2003 data showed that 45% of children under age six and served by Medicaid living in established ABCD counties had at least one preventive dental visit compared with 36% of children in non-ABCD counties (Lewis, Teeple, Robertson, & Williams, 2009). A 2005 paper, based on data before ABCD was implemented statewide, showed children living in a county with an ABCD program had less tooth decay than children living in a county without an ABCD program, although these improvements in oral health were associated with increased costs (Kobayashi, Chi, Coldwell, Domoto,& Milgrom, 2005).

Despite the program's success, not all eligible children utilize ABCD services. A study of Medicaid files and information from the Centers for Medicare & Medicaid Services reviewed dental utilization for young children on Medicaid and found that only 21% of children under age three utilized preventive care (Hakim, Babish, & Davis, 2012). Previous studies have examined the effectiveness and costs of ABCD, but no studies have investigated subgroups within the zero to six year-old population that may be underserved, including CSHCN. The goal of this study is to assess the ABCD program by comparing dental care utilization rates for young children with and without SHCN. It is hypothesized that Medicaid enrolled CSHCN within the ABCD program utilize preventive dental care at lower rates than children without SHCN.

METHODS

Data sources and human subjects protection. This is a cross-sectional analysis of 2012 Medicaid data from Washington state. Medicaid is a publicly funded program that provides medical and dental insurance for low-income individuals including children from low-income families. In Washington state during 2012, children living in households at or below 200% of the federal poverty level (FPL) were eligible for Medicaid at no cost and those living between 200% and 300% of the FPL could participate with a nominal fee (Children's Alliance, 2010).

The data were obtained from the Washington State Health Care Authority and included both enrollment (demographic information) and claims files (billed medical, dental, institutional, hospital, and pharmacy services). Demographic information consisted of date of birth, gender, race, ethnicity, county of residence, and Medicaid eligibility group. We also had access to information on dental care providers

(e.g., dentist, physician). Each child had a unique identifier, which was used to link enrollment and claims files. This study was approved by the Washington State Institutional Review Board in Olympia, Washington (WA state IRB D-060713-A13.31).

For this study, the data were restricted to those under six years old, to reflect the population eligible for ABCD participation (calculated as of Dec 31, 2012, N=299,152). The data were then limited children who were enrolled in Medicaid for 11-12 months of 2012 (N=206,488, see Figure 1).

Independent Variable. The main independent variable for this study was SHCN status (yes or no). We used Medicaid claims files (inpatient, outpatient, and institutional claims) and Medicaid eligibility files to develop three indicators for SHCN. Children who meet any one of these three criteria were considered to have SHCN:

1. Qualifying for Medicaid through Supplemental Security Income (SSI) and gained eligibility for Medicaid through SSI for 12 months (Chi et al., 2013). Children qualify for Medicaid through SSI if they are determined to have a "marked and severe functional limitation" for at least 12 months through the Child Disability Report, a three part interview that is reviewed by the state to determine disability status under Social Security law (Social Securty Administration, 2015).
2. Having a diagnosis of an intellectual and/or developmental disability (IDD), due to a) cognitive deficiency or impairment, b) congenital condition (not acquired), and c) expected to last a lifetime, as outlined by Chi, Momany, Kuthy, Chalmers, & Damiano (2010). Conditions including Autism, Intellectual Developmental Delay, Cerebral Palsy, Spina bifida, Trisomy 21, Tuberous Sclerosis, Fragile X syndrome, and Fetal Alcohol Syndrome were identified by using International Classification of Diseases, Ninth Revision, Clinical Modification codes (ICD-9), see Appendix Table 1.
3. Diagnosed with conditions or situations that indicate use of healthcare services and an increased risk for developing a chronic health condition. This category allowed us to capture young children who are at highest risk for developing a chronic health condition. Examples of conditions include premature birth, low birth weight, infantile seizures, apnea of the newborn,

ventilator use, gastrostomy, and tracheotomy. Conditions were identified using ICD-9, CPT, and Healthcare Common Procedure Coding Systems (HCPCS) codes, see Appendix Table 2.

Outcome Variable. The outcome was preventive dental care utilization (yes or no). Preventive dental care utilization was defined as the presence of CDT codes D0120 (periodic oral evaluation), D0150 (comprehensive oral evaluation), D1120 (child prophylaxis), D1206 (topical fluoride varnish), D1208 (topical application of fluoride), D0272 (two bite wing radiographs), D0274 (four bitewing radiographs), or D1351 (sealant) (Heidenreich, Kim, Scott, & Chi, 2015). By using CCT codes, only preventive dental services provided by dentists were included in the outcome measure. Preventive dental care provided by physicians was excluded.

Confounders and other study variables. Six patient-level variables were theorized as potential confounders of the relationship between SHCN status and utilization of preventive dental services. 1) Race (white vs. non-white). It has been shown that utilization of preventive dental care varies between different racial groups in the same geographic region and different ethnic groups within the same race (Valencia et al., 2012). 2) Ethnicity (Hispanic vs. non-Hispanic). Hispanic ethnicity has been shown to be a moderator in the relationship between race and receipt of orthodontic care (Merritt, Greenlee, Bollen, Scott, & Chi, 2016). 3) Residence in a Health Professional Shortage Area (HPSA). HPSAs are rural or urban geographic regions with a shortage of primary medical, dental or mental health providers. Official designations are made for each profession by meeting multiple criteria (U.S. Department of Health and Human Services: Health Resources & Services Administration, 2016). Living in a dental Health Professional Shortage Area (dental HPSA) has been associated with lower utilization of dental care by CSHCN (Chi, Momany, Neff et al., 2010). In this study, we used county of residence to determine HPSA designation (full, partial, none). 4) Medical care use (yes/no). Medical homes are intended to be places of coordinated primary care that can lead to increased interdisciplinary communications (Swihart, 2016). Having a medical home has been implicated in CSHCN receiving preventive dental services (Kenney, 2009). Medical care use was substituted as an approximation for having a medical home since the data set did not include information about medical homes. 6) Age, calculated on of 12/31/12. 7) Gender (male/female).

Data analysis. Descriptive statistics were generated for all variables. The child was the unit of analysis for all regression models. Theoretical confounders were tested to determine if they are statistically significant using the χ^2 test. Those variables found to have a significant association with both SHCN status and preventive dental care use were included in the adjusted regression analysis. Modified Poisson regression was used to determine the association between SHCN status and utilization of preventive dental services (Zou, 2004). Both unadjusted and adjusted prevalence rate ratios with 95% confidence intervals (CI) are reported from the regression models. Significance was set to $\alpha = 0.05$. All analyses were conducted using Stata 13 for Windows (StataCorp LP, College Station, Texas, USA).

RESULTS

Study Population. The study population was evenly distributed among the one to five year age categories and between male and female. (Table 1) Most of the study population was white (33.7%) and non-Hispanic (58.7%). Many in the study reported "other" (22.4%) or marked no identification for race (34%). The Alaskan Native, American Indian, Asian, Black, Hawaiian, and Pacific Islander groups collectively comprised less than ten percent of the study population. The majority of children in the study lived in an area where part of the county is a dental HPSA (78%). Only one county was considered to have no professional shortage. Most children had received preventive medical care in 2012, but 18,264 (15.9%) children did not receive any preventive medical or dental care. (Table 1)

SHCN Status. The majority of the study population did not qualify as having SHCN (71.7%). (Table 2) Of those who were determined to have SHCN (28.3%), the majority did so by being at risk for chronic health conditions, particularly by premature birth and infantile seizures. Only 1.3% of the total study population qualified for Medicaid through SSI and 1.1% of the total population were identified as having intellectual or developmental disabilities (IDD). Of those who were identified in the IDD category, the majority were diagnosed with Autism or Trisomy 21. (Table 2)

Those with SHCN tended to be younger than the general study population, white or did not mark a race, non-Hispanic, from a county that was a partial HPSA, and utilized medical care. (Table 3).

Dental Care Utilization. A total of 206,488 children under age six were enrolled in Medicaid for 11-12 consecutive months in 2012 (Figure 1). Of these, 114,570 children had a preventive dental visit (55.5%). Those who used preventive dental care tended to be older, ages three through five years. Few children under the age of one year had a preventive dental visit (9.7%). Tables 1 and 2 summarize the study population in terms of preventive dental care use.

Confounder Analysis. Age, ethnicity, race, county HPSA, and preventive medical care use all had significant associations with SHCN status (Table 3) and preventive dental care use (Table 1); they were included in the final adjusted regression analysis. Hispanic ethnicity and use of preventive medical services were associated with increased utilization of preventive dental services. Factors associated with decreased utilization of preventive dental services included age, race, and county HPSA designation (Table 1).

Modified Poisson Regression Analyses. In the unadjusted regression analysis, CSHCN were 0.96 times as likely to use preventive dental services as their typically developing peers (95% CI: 0.95 - 0.97; $p < 0.001$) (Table 4). In the adjusted modified Poisson regression analysis, relationship between SHCN status and preventive dental care utilization changed from a protective relationship to a harmful one. In the adjusted model, CSHCN were 1.04 more likely to receive preventive dental services, a significant difference (95% CI: 1.03 - 1.05, $p < 0.001$). (Table 4)

DISCUSSION

This is the first known study to analyze a specific sub-group within the ABCD population in Washington state. We found that CSHCN in the low-income population served by ABCD were slightly more likely to receive preventive dental services than their typically developing peers. This finding is consistent with other studies, which report that CSHCN are equally or slightly more likely to receive preventive care than children without SHCN (Chi, Momany, Kuthy, et al., 2010; Van Cleave & Davis, 2008; Iida, Lewis, Zhou, Novak, & Grembowski, 2010). The question that remains is if the small increase in receipt of preventive dental services by CSHCN is enough to address their increased need for dental care. Other studies with

similar results have gone on to find that although CSHCN utilize more dental services, they also have more unmet dental need (Van Cleave & Davis).

The percent of children identified with SHCN in our study (28.3%) differed from the estimated national percentage (9.3%) (Data Resource Center for Child & Adolescent Health, n.d.). Because our study population was focused on young children, we cast a wide net to capture children who were at risk for developing SHCN and may not yet have a formal diagnosis (Chi, Momany, Kuthy, et al., 2010; Council on Children with Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, 2006). Over half the children identified as having SHCN used preventive dental care (54.0%). Two subgroups of CSHCN were outstanding for having a lower percentage of preventive dental care utilization: children with low birth weight (27.7%) and children with apnea as a newborn (13.3%). These subgroups may be vulnerable populations that require extra attention to ensure they receive necessary preventive care.

Interestingly, the association between SHCN status and preventive dental care use changed between the unadjusted (PRR= 0.96) and adjusted (PRR=1.04) models. To explore the reasons for this we examined how the SHCN demographics differed from the demographics of the entire study population and found it was mainly in preventive medical care use and age. The CSHCN were more likely to be under age two years and more likely to have utilized preventive medical care use than the general study population. These two covariates influenced preventive dental care in opposing ways. Children who used preventive medical care were 1.55 times more likely to also use preventive dental care than those who did not use preventive medical care (95% CI: 1.52 - 1.58; $p < 0.001$). Meanwhile, children under age one year were 0.14 times as likely to use care (95% CI: 0.12 - 0.15, $p<0.001$) and children under two were 0.48 times as likely to use care as children who were five years of age (95% CI: 0.47 - 0.49, $p <0.01$). Because the relationship between SHCN status and preventive dental care use changed from decreased utilization to increased utilization between the models, it is likely that the negative effect of young age accounts for the different outcomes of the two models. In fact, when running the adjusted model without age, the PRR is 0.91, indicating that when excluding age, CSHCN are less likely to utilize preventive dental care than their typically developing peers (95% CI: 0.90-0.92, $p<0.001$)

One subgroup of CSHCN utilized preventive dental care at a much higher rate than the other groups: children designated as having Fragile X Syndrome. While there were only 10 cases identified, nine of those children utilized preventive dental services. It would be interesting to know more about this subgroup and extrapolate factors related to their success in obtaining dental care. The Fragile X community may be a model for preventive dental care use in CSHCN.

There were several limitations to our study. Our data set did not provide a way to identify SES or parental age, which are likely confounders. Children of low SES have a higher incidence of SHCN and lower utilization of dental services (United States Government Accountability Office, 2008; van Dyck, Kogan, McPherson, Weissman, & Newacheck, 2004). In 2012, CSHCN qualified for Medicaid services up to 312% of the FPL, which may not be considered to be poverty by some. However, recent research shows that eligibility criteria is not likely to predict unmet dental care need (McManus, Chi, & Carle, 2015). Additionally, some children may have access to secondary insurances, which we did not know for our study. However, this is more likely to be true after January 2014 when Washington state expanded Medicaid eligibility and services under the Affordable Care Act.

Parental age is a possible confounder, as mothers of increased age are more likely to have CSHCN and may also be more likely to take their children to the dentist due to increased education level (Morris, Mutton, & Alberman, 2002; Resta, 2005; Van den Branden, Van den Broucke, Leroy, Declerck, & Hoppenbrouwers, 2012). Other parental information such as education level, health status, and oral health status were not available in our data set and is a limitation of our study.

This information may not be applicable to other states and other types of dental care programs. ABCD is unique to Washington state and has affected dental care utilization across the state since its implementation in 1995 (Grembowski & Milgrom, 2000; Kobayashi, Chi, Coldwell, Domoto, & Milgrom, 2005; Nagahama, Fuhriman, Moore, & Milgrom, 2002).

CONCLUSIONS

This study found that CSHCN in Washington state are more likely to receive preventive dental services than children without SHCN. However, the increase in receipt of care is small and likely not

enough to address the increased need for dental care in the SHCN population. Other factors including older age, having preventive medical care, not residing in a dental HPSA, and identifying as Hispanic were associated with increased likelihood that a child had a preventive dental appointment. While Washington ranks high in the country for preventive dental care use by young children, there is great room for improvement as only 55.5% of children in our study received preventive dental care (Hakim, Babish, & Davis, 2012).

Based on our findings, future studies in this area would include a) determining differences in unmet dental need between CSHCN and children without SHCN who qualify for the ABCD program; b) Investigating if there are subgroups within the SHCN category that utilize preventive dental care differently than the SHCN group at large.

REFERENCES

American Academy of Pediatric Dentistry. (2012). Guideline on management of dental patients with special health care needs. *Clinical Guidelines Reference Manual*, *36*(6), 161–166. Retrieved from http://www.aapd.org/media/Policies_Guidelines/G_SHCN.pdf

American Academy of Pediatric Dentistry. (2008). Guideline on Periodicity of Examination, Preventive Dental Services, Anticipatory Guidance/Counseling, and Oral Treatment for Infants, Children, and Adolescents. *Clinical Guidelines Reference Manual*, *38*(6), 133–141.

American Academy of Pediatric Dentistry. (2016). Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. *Clinical Guidelines Reference Manual*, *37*(6), 50-52.

Brickhouse, T. H., Rozier, R. G., & Slade, G. D. (2008). Effects of enrollment in medicaid versus the State Children's Health Insurance Program on kindergarten children's untreated dental caries. *American Journal of Public Health*, *98*(5), 876–881. http://doi.org/10.2105/AJPH.2007.111468

Chen, C.-Y., Chen, Y.-W., Tsai, T.-P., & Shih, W.-Y. (2014). Oral health status of children with special health care needs receiving dental treatment under general anesthesia at the dental clinic of Taipei Veterans General Hospital in Taiwan. *Journal of the Chinese Medical Association*, *77*(4), 198–202. http://doi.org/10.1016/j.jcma.2014.01.008

Chi, D. L., McManus, B. M., & Carle, A. C. (2014). Caregiver burden and preventive dental care use for US children with special health care needs: A stratified analysis based on functional limitation. *Maternal and Child Health Journal*. http://doi.org/10.1007/s10995-013-1314-x

Chi, D. L., Momany, E. T., Jones, M. P., Kuthy, R. A., Askelson, N. M., Wehby, G. L., & Damiano, P. C. (2013). Relationship between medical well baby visits and first dental examinations for young children in Medicaid. *American Journal of Public Health*. http://doi.org/10.2105/

Chi, D. L., Momany, E. T., Kuthy, R. A., Chalmers, J. M., & Damiano, P. C. (2010). Preventive dental utilization for Medicaid-enrolled children in Iowa identified with intellectual and/or developmental

disability. *Journal of Public Health Dentistry*. http://doi.org/10.1111/j.1752-7325.2009.00141.x

Chi, D. L., Momany, E. T., Neff, J., Jones, M. P., Warren, J. J., Slayton, R. L., … Damiano, P. C. (2010). Impact of chronic condition status and severity on dental treatment under general anesthesia for Medicaid-enrolled children in Iowa state. *Paediatric Anaesthesia*, *20*(9), 856–865. http://doi.org/10.1111/j.1460-9592.2010.03371.x

Chi, D. L., Rossitch, K. C., & Beeles, E. M. (2013). Developmental delays and dental caries in low-income preschoolers in the USA: a pilot cross-sectional study and preliminary explanatory model. *BMC Oral Health*, *13*(1), 53. http://doi.org/10.1186/1472-6831-13-53

Children's Alliance. (2010). Washington's commitment to health coverage for all children. Retrieved from http://www.childrensalliance.org/sites/default/files/Cover_All_Kids_Summary_2009.pdf

Council on Children with Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee. (2006). Identifying Infants and Young Children with Developmental Disorders in the Medical Home: An Algorithm for Developmental Surveillance and Screening. *Pediatrics*, *118*(1), 405–420. http://doi.org/10.1542/peds.2006-1231

Data Resource Center for Child & Adolescent Health (n.d.). Interactive Data Query: 2009/10 National Survey of Children with Special Health Care Needs. Retrieved September 24, 2015, from www.childhealthdata.org

DeMattei, R., Cuvo,A., & Maurizio, S. (2007). Oral assessment of children with an autism spectrum disorder. *Journal of Dental Hygiene : JDH / American Dental Hygienists' Association*, *81*(3), 65.

Diolordi, L., DelBalzo, V., Bernabei, P., Vitiello, V., & Donini, L. (2014). Eating habits and dietary patterns in children with autism. *Eating and Weight Disorders*, *19*(3), 295–301.

Donaldson, M., Goodchild, J. H., & Epstein, J. B. (2015). Sugar content, cariogenicity, and dental concerns with commonly used medications. *The Journal of the American Dental Association*, *146*, 129–133. http://doi.org/10.1016/j.adaj.2014.10.009

Dye, B. A., Hsu, K.-L. C., & Afful, J. (2015). Prevalence and Measurement of Dental Caries in Young Children. *Pediatric Dentistry*, *37*(3), 200–2016.

Dye, B. A., Vargas, C. M., Lee, J. J., Magder, L., & Tinanoff, N. (2011). Assessing the relationship between children's oral health status and that of their mothers. *JADA*, *142*(2), 173–83.

Foster, H., & Fitzgerald, J. (2005). Dental disease in children with chronic illness. *Archives of Disease in Childhood*. http://doi.org/10.1136/adc.2004.058065

Grembowski, D., & Milgrom, P. M. (2000). Increasing access to dental care for Medicaid preschool children: The Access to Baby and Child Dentistry (ABCD) Program. *Public Health Reports*, *115*(5), 448–459. http://doi.org/10.1093/phr/115.5.448

Hakim, R. B., Babish, J. D., & Davis, a. C. (2012). State of Dental Care Among Medicaid-Enrolled Children in the United States. *Pediatrics*, *130*(1), 5–14. http://doi.org/10.1542/peds.2011-2800

Hamasha, A. A., Warren, J. J., Levy, S. M., Broffitt, B., & Kanellis, M. J. (2006). Oral health behaviors of children in low and high socioeconomic status families. *Pediatric Dentistry*, *28*(4), 310–315.

Heidenreich, J. F., Kim, A. S., Scott, J. M., & Chi, D. L. (2015). HHS Public Access. *Pedicatirc Dentistry*, *37*(4), 371–375. http://doi.org/10.1001/jama.2014.15298.Metformin

Huebner, C. E., Chi, D. L., Masterson, E., & Milgrom, P. (2014). Preventive dental health care experiences of preschool-age children with special health care needs. *Special Care in Dentistry : Official Publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry*, *5*(X), 1–10. http://doi.org/10.1111/scd.12084

Iida, H., Lewis, C., Zhou, C., Novak, L., & Grembowski, D. (2010). Dental care needs, use and expenditures among U.S. children with and without special health care needs. *Journal of the American Dental Association (1939)*.

Kane, D., Mosca, N., Zotti, M., & Schwalberg, R. (2008). Factors associated with access to dental care for

children with special health care needs. *Journal of the American Dental Association (1939)*, *139*(3), 326–333. http://doi.org/10.14219/jada.archive.2008.0162

Kenney, M. K. (2009). Oral health care in CSHCN: state Medicaid policy considerations. *Pediatrics*, *124 Suppl*, S384-91. http://doi.org/10.1542/peds.2009-1255I

Kobayashi, M., Chi, D., Coldwell, S. E., Domoto, P., & Milgrom, P. (2005). The effectiveness and estimated costs of the access to baby and child dentistry program in Washington State. *Journal of the American Dental Association (1939)*. http://doi.org/10.14219/jada.archive.2005.0341

Lewis, C., Robertson, A. S., & Phelps, S. (2005). Unmet dental care needs among children with special health care needs: implications for the medical home. *Pediatrics*, *116*(3), e426–e431. http://doi.org/10.1542/peds.2005-0390

Lewis, C., Teeple, E., Robertson, A., & Williams, A. (2009). Preventive dental care for young, Medicaid-insured children in Washington state. *Pediatrics*. http://doi.org/10.1542/peds.2008-3089

Lewis, C. W. (2009). Dental Care and Children with Special Health Care Needs: A Population-Based Perspective. *Academic Pediatrics*, *9*(6), 420–426. http://doi.org/10.1016/j.acap.2009.09.005

McManus, B. M., Chi, D., & Carle, A. (2015). State Medicaid Eligibility Criteria and Unmet Preventive Dental Care Need for CSHCN. *Maternal and Child Health Journal*. http://doi.org/10.1007/s10995-015-1843-6

McPherson, Merle, M., Arango, P., Fox, H., Lauver, C. L., McManus, Margaret McManus, Newacheck, P. W. D., … Strickland, Bonnie, P. (1998). A New Definition of Children With Special Health Care Needs. *Pediatrics*, *102*(1), 137–140.

Merritt, J. M., Greenlee, G., Bollen, A. M., Scott, J. M., & Chi, D. L. (2016). Racial disparities in orthodontic service use for Medicaid-enrolled children: An evaluation of the Washington Medicaid program. *American Journal of Orthodontics and Dentofacial Orthopedics*, *149*(4), 516–522. http://doi.org/10.1016/j.ajodo.2015.09.025

Mohinderpal Chadha, G., Kakodkar, P., Chaugule, V., & Nimbalkar, V. (2012). Dental Survey of Institutionalized Children with Autistic Disorder. *International Journal of Clinical Pediatric Dentistry*, *5*(April), 29–32. http://doi.org/10.5005/jp-journals-10005-1130

Morris, J. K., Mutton, D. E., & Alberman, E. (2002). Revised estimates of the maternal age specific live birth prevalence of Down's syndrome. *Journal of Medical Screening*, *9*(1), 2–6. http://doi.org/10.1136/jms.9.1.2

Nagahama, S. I., Fuhriman, S. E., Moore, C. S., & Milgrom, P. (2002). Evaluation of a dental society-based ABCD program in Washington state. *Journal of the American Dental Association (1939)*, *133*(9), 1251–7. http://doi.org/10.14219/jada.archive.2002.0367

Nelson, L. P., Getzin, A., Graham, D., Zhou, J., Wagle, E. M., McQuiston, J., … Huntington, N. L. (2011). Unmet dental needs and barriers to care for children with significant special health care needs. *Pediatric Dentistry*.

Norwood, K. W., & Slayton, R. L. (2013). Oral Health Care for Children With Developmental Disabilities. *Pediatrics*, *131*(3), 614–619.doi: 10.1542/peds.2012-3650.

Petrova, E. G., Hyman, M., BA, Estrella, R. M. P, Inglehart, M. R., & Habil, P. (2014). Children with Special Health Care Needs: Exploring the Relationships between Patients' Level of Functioning, Their Oral Health, and Caregivers' Oral Health-related Responses. *PEDIATRIC DENTISTRY*, *36*(3), 233–239.

Resta, R. G. (2005). Changing demographics of advanced maternal age (AMA) and the impact on the predicted incidence of Down syndrome in the United States: Implications for prenatal screening and genetic counseling. *American Journal of Medical Genetics. Part A*, *133A*(1), 31–6. http://doi.org/10.1002/ajmg.a.30553

Social Securty Administration. (2015). Benefits for children with disabilities. Retrieved from https://www.ssa.gov/disabilityssi/ssi.html#&a0=1

Solanki, N., Kumar, A., Awasthi, N., Kundu, A., Mathur, S., & Bidhamadhav, S. (2016). Assessment of

Oral Status in Pediatric Patients with Special Health Care Needs receiving Dental Rehabilitat. *The Journal of Contemporary Dental Practice*, *17*(6), 476–479.

StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.

Swihart, D. (2016). Finding Common Ground. *Nursing Administration Quarterly*, *40*(No. 2, April-June), 103–108. http://doi.org/10.1097/NAQ.0000000000000149

Tomar, S. L., & Reeves, A. F. (2009). Changes in the Oral Health of US Children and Adolescents and Dental Public Health Infrastructure Since the Release of the Healthy People 2010 Objectives. *Academic Pediatrics*, *9*(6), 388–395. http://doi.org/10.1016/j.acap.2009.09.018

Treadwell, H. M., & Northridge, M. E. (2007). Oral health is the measure of a just society. *Journal of Health Care for the Poor and Underserved*, *18*(404), 12–20. http://doi.org/10.1353/hpu.2007.0021

United States Government Accountability Office. (2008). Extent of Dental Disease in Children Has Not Decreased, and Millions Are Estimated to Have Untreated Tooth Decay. GAO-08-1121. Retreived from gao.gov/new.item/d081121.pdf

U. S. Department of Health and Human Services (2000). Oral Health in America: A Report of the Surgeon General. U. S. Department of Health and Human Services, national Institute of Dental and Craniofacial Research, national Institutes of Health.

U.S. Department of Health and Human Services: Health Resources & Services Administration (2016). Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations. Retrieved July 3, 2016, from http://www.hrsa.gov/shortage/

Valencia, A., Damiano, P., Qian, F., Warren, J. J., Weber-Gasparoni, K., & Jones, M. (2012). Racial and ethnic disparities in utilization of dental services among children in iowa: The Latino experience. *American Journal of Public Health*, *102*(12), 2352–2359. http://doi.org/10.2105/AJPH.2011.300471

Van Cleave, J. & Davis, M. M. (2008). Preventive Care Utilization Among Children With and Without Special Health Care Needs: Associations With Unmet Need.

Van den Branden, S., Van den Broucke, S., Leroy, R., Declerck, D., & Hoppenbrouwers, K. (2012). Effects of time and socio-economic status on the determinants of oral health-related behaviours of parents of preschool children. *European Journal of Oral Sciences*, *120*(2), 153–60. http://doi.org/10.1111/j.1600-0722.2012.00951.x

van Dyck, P. C., Kogan, M. D., McPherson, M. G., Weissman, G. R., & Newacheck, P. W. (2004). Prevalence and characteristics of children with special health care needs. *Archives of Pediatrics & Adolescent Medicine*, *158*(9), 884–890. http://doi.org/10.1001/archpedi.158.9.884

Washington State Healthcare Authority (2015). Access to Baby and Child Dentistry Web Page. Retrieved December 2, 2015, from http://abcd-dental.org/

Wiener, R. C., Vohra, R., Sambamoorthi, U., & Madhavan, S. S. (2016). Caregiver Burdens and Preventive Dental Care for Children with Autism Spectrum Disorder, Developmental Disability and/or Mental Health Conditions: National Survey of CSHCN, 2009???2010. *Maternal and Child Health Journal*. http://doi.org/10.1007/s10995-016-2083-0

Zou, G. (2004). A Modified Poisson Regression Approach to Prospective Studies with Binary Data. *American Journal of Epidemiology*, *159*(7), 702–706. http://doi.org/10.1093/aje/kwh090

Figure 1. Selection of Study Population from 2012 Washington State Medicate Data.

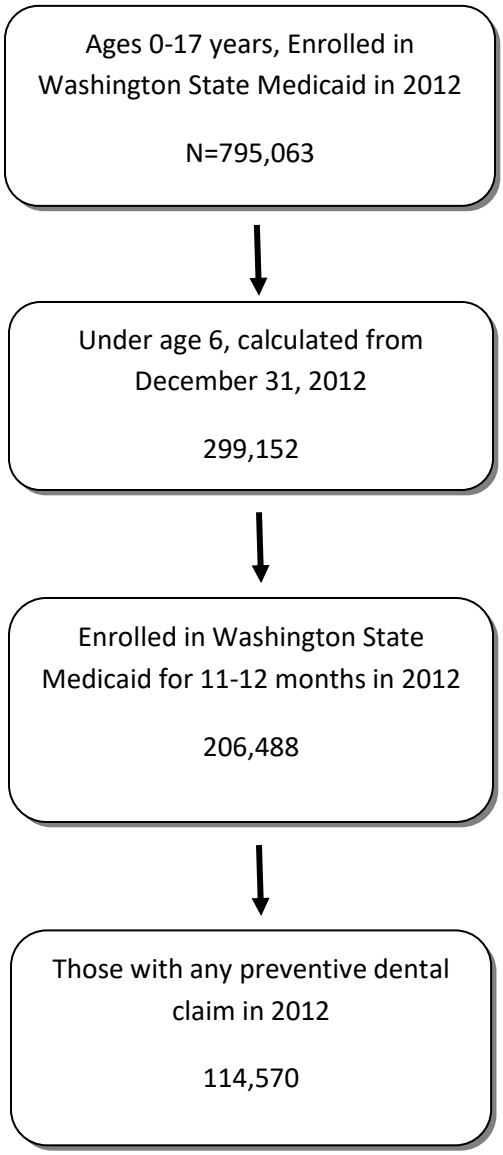

Table 1. Description of study population of Washington children (0-5 years old) enrolled in Medicaid for 11 or more months by preventive dental visit and significance testing results via chi squared analysis

	No preventive dental visit (N = 91,918)	Any preventive dental visit (N = 114,570)	Totals (N = 206,488)	Utilization	p-value
	N (%)	N (%)	N (%)		
Age on 12/31/2012					<0.001
0	5990 (6.5%)	647 (0.6%)	6637 (3.2%)	647/6637 (9.7%)	
1	25589 (27.8%)	13789 (12%)	39378 (19.1%)	13789/39378 (35.0%)	
2	18307 (19.9%)	20196 (17.6%)	38503 (18.6%)	20196/38503 (52.5%)	
3	16177 (17.6%)	24081 (21%)	40258 (19.5%)	24081/40258 (59.8%)	
4	13485 (14.7%)	27324 (23.8%)	40809 (19.8%)	27324/40809 (67.0%)	
5	12370 (13.5%)	28533 (24.9%)	40903 (19.8%)	28533/40903 (69.8%)	
Gender					0.148
Female	44692 (48.6%)	56073 (48.9%)	100765 (48.8%)	56073/100765 (55.6%)	
Male	47226 (51.4%)	58497 (51.1%)	105723 (51.2%)	58496/105723 (55.3%)	
Race					<0.001
White	34546 (37.6%)	35066	69612	35066/69612	

		(30.6%)	(33.7%)	(50.4%)	
Alaskan Native	37 (0%)	29 (0%)	66 (0%)	29/66 (43.9%)	
American Indian	2531 (2.8%)	2007 (1.8%)	4538 (2.2%)	2007/4538 (44.2%)	
Asian	1833 (2%)	2433 (2.1%)	4266 (2.1%)	2433/4266 (57.0%)	
Black	3888 (4.2%)	4226 (3.7%)	8114 (3.9%)	4226/8114 (52.1%)	
Hawaiian	211 (0.2%)	193 (0.2%)	404 (0.2%)	193/404 (47.8%)	
Pacific Islander	1321 (1.4%)	1581 (1.4%)	2902 (1.4%)	1581/2902 (54.5%)	
Other	14456 (15.7%)	31868 (27.8%)	46324 (22.4%)	31868/46324 (68.8%)	
Not Provided	33095 (36%)	37167 (32.4%)	70262 (34%)	37167/70262 (52.9%)	
Ethnicity					<0.001
Non-Hispanic	59247 (64.5%)	61892 (54%)	121139 (58.7%)	61892/121139 (51.1%)	
Hispanic	13293 (14.5%)	31137 (27.2%)	44430 (21.5%)	31137/444370 (70.1%)	
Missing	19378 (21.1%)	21541 (18.8%)	40919 (19.8%)	21541/40919 (52.6%)	
Resides in Dental HPSA*					<0.001
No shortage areas in	6171	7217	13388	7217/13388	

county	(6.7%)	(6.3%)	(6.5%)	(53.9%)	
Whole county a shortage area	15020 (16.3%)	17016 (14.9%)	32036 (15.5%)	17016/32036 (53.1%)	
Part of county a shortage area	70706 (76.9%)	90322 (78.8%)	161028 (78%)	90322/161028 (56.1%)	
Missing	21 (0%)	15 (0%)	36 (0%)	15/36 (41.7%)	
Preventive Medical Care Use					<0.001
No	18264 (19.9%)	12321 (10.8%)	30585 (14.8%)	12321/30585 (40.3%)	
Yes	73654 (80.1%)	102249 (89.2%)	175903 (85.2%)	102249/175903 (58.1%)	

*HPSA = Health Professional Shortage Area

Table 2: Special Health Care Needs by Preventive Dental Care Visits

	No preventive dental visit (N = 91,918)	Any preventive dental visit (N = 114,570)	Totals (N=206,488)	Utilization	Significance
	N (%)	N (%)	N (%)		
Any Special Health Care Needs (all categories)					<0.001
No	64987 (70.7%)	82990 (72.4%)	147977 (71.7%)	82990/147977 (56.1%)	
Yes	26931 (29.3%)	31580 (27.6%)	58511 (28.3%)	31580/58511 (54.0%)	
1. SSI Eligible for 12 months					0.577
No	90700 (98.7%)	113084 (98.7%)	203784 (98.7%)	113084/203784 (55.5%)	
Yes	1218 (1.3%)	1486 (1.3%)	2704 (1.3%)	1486/2705 (55.0%)	
2. Any Intellectual or Developmental Disabilities					0.478
No	90892 (98.9%)	113253 (98.9%)	204145 (98.9%)	113253/204145 (55.%)	
Yes	1026 (1.1%)	1317 (1.1%)	2343 (1.1%)	1317/2343 (56.2%)	
Any Autism					0.211
No	91414 (99.5%)	113894 (99.4%)	205308 (99.4%)	113894/205308	

				(55.5%)	
	Yes	504 (0.5%)	676 (0.6%)	1180 (0.6%)	676/1180 (57.3%)	
Any Mental						0.149
	No	91902 (100%)	114539 (100%)	206441 (100%)	114539/206441 (55.5%)	
	Yes	16 (0%)	31 (0%)	47 (0%)	31/47 (66.0%)	
Any Cerebral Palsy						0.542
	No	91760 (99.8%)	114360 (99.8%)	206120 (99.8%)	114360/206120 (55.5%)	
	Yes	158 (0.2%)	210 (0.2%)	368 (0.2%)	210/368 (57.1%)	
Any Spina Bifida						0.188
	No	91873 (100%)	114498 (99.9%)	206371 (99.9%)	114498/206371 (55.5%)	
	Yes	45 (0%)	72 (0.1%)	117 (0.1%)	72/117 (61.5%)	
Any Trisomy 21						0.099
	No	91611 (99.7%)	114234 (99.7%)	205845 (99.7%)	114234/205845 (55.5%)	
	Yes	307 (0.3%)	336 (0.3%)	643 (0.3%)	336/643 (52.3%)	
Any Tuberous Sclerosis;						0.680

Bourneville's Disease					
	No	91911 (100%)	114563 (100%)	206474 (100%)	114563/206474 (55.5%)
	Yes	7 (0%)	7 (0%)	14 (0%)	7/14 (50.0%)
Any Fragile X Syndrome					0.028
	No	91917 (100%)	114561 (100%)	206478 (100%)	114561/206478 (55.5%)
	Yes	1 (0%)	9 (0%)	10 (0%)	9/10 (90.0%)
Any Fetal Alcohol Syndrome					0.968
	No	91891 (100%)	114536 (100%)	206427 (100%)	114536/206427 (55.5%)
	Yes	27 (0%)	34 (0%)	61 (0%)	34/61 (55.7%)
3. At Risk for Chronic Health Needs					<0.001
	No	65917 (71.7%)	83986 (73.3%)	149903 (72.6%)	83986/149903 (56.0%)
	Yes	26001 (28.3%)	30584 (26.7%)	56585 (27.4%)	30584/56585 (54.0%)
Any Ventilator Use					N/A
	No	91918 (100%)	114570 (100%)	206488 (100%)	114570/206488 (55.5%)
	Yes	0	0	0	0/0

	(0%)	(0%)	(0%)	(0%)	
Any Gastrostomy					0.001
No	91629 (99.7%)	114297 (99.8%)	205926 (99.7%)	114297/205926 (55.5%)	
Yes	289 (0.3%)	273 (0.2%)	562 (0.3%)	273/562 (48.6%)	
Any Tracheotomy					0.751
No	91757 (99.8%)	114376 (99.8%)	206133 (99.8%)	114376/206133 (55.5%)	
Yes	161 (0.2%)	194 (0.2%)	355 (0.2%)	194/355 (54.6%)	
Any Low Birth Weight					<0.001
No	90963 (99%)	114213 (99.7%)	205176 (99.4%)	114213/205176 (55.7%)	
Yes	955 (1%)	357 (0.3%)	1312 (0.6%)	357/1312 (27.2%)	
Any Premature Birth					<0.001
No	66951 (72.8%)	85926 (75%)	152877 (74%)	85926/152877 (56.2%)	
Yes	24967 (27.2%)	28644 (25%)	53611 (26%)	28644/53611 (53.4%)	
Any Infantile Seizures					0.226
No	69728 (75.9%)	86648 (75.6%)	156376 (75.7%)	86648/156376 (55,4%)	
Yes	22190 (24.1%)	27922	50112 (24.3%)	27922/50112	

		(24.4%)		(55.7%)	
Any Apnea of the Newborn					<0.001
No	91416 (99.5%)	114493 (99.9%)	205909 (99.7%)	114493/205909 (55.6%)	
Yes	502 (0.5%)	77 (0.1%)	579 (0.3%)	77/579 (13.3%)	

Table 3: Description of study population of Washington children (0-5 years old) enrolled in Medicaid for 11-12 months by SHCN status and significance testing results via chi squared analysis

	No SHCN (N = 147,977)	SHCN (N = 58,511)	Totals (N = 206,488)	SHCN	Significance
	N (%)	N (%)	N (%)		
Age on 12/31/2012					<0.001
0	2342 (1.6%)	4295 (7.3%)	6637 (3.2%)	4295/6637 (64.7%)	
1	23053 (15.6%)	16325 (27.9%)	39378 (19.1%)	1632/39378 (41.5%)	
2	26563 (18%)	11940 (20.4%)	38503 (18.6%)	11940/38503 (31.0%)	
3	30649 (20.7%)	9609 (16.4%)	40258 (19.5%)	9609/40258 (23.9%)	
4	32367 (21.9%)	8442 (14.4%)	40809 (19.8%)	8442/40809 (20.7%)	
5	33003 (22.3%)	7900 (13.5%)	40903 (19.8%)	7900/40903 (19.3%)	
Gender					<0.001
Female	72980 (49.3%)	27785 (47.5%)	100765 (48.8%)	27785/100765 (27.6%)	
Male	74997 (50.7%)	30726 (52.5%)	105723 (51.2%)	30726/105723 (29.1%)	
Race					<0.001
White	51088 (34.5%)	18524 (31.7%)	69612 (33.7%)	18524/69612 (26.6%)	
Alaskan Native	48	18	66	18/66	

	(0%)	(0%)	(0%)	(27.3%)	
American Indian	3234 (2.2%)	1304 (2.2%)	4538 (2.2%)	1304/4538 (28.7%)	
Asian	3149 (2.1%)	1117 (1.9%)	4266 (2.1%)	1117/4266 (26.2%)	
Black	6003 (4.1%)	2111 (3.6%)	8114 (3.9%)	2111/8114 (26.0%)	
Hawaiian	308 (0.2%)	96 (0.2%)	404 (0.2%)	96/404 (23.8%)	
Pacific Islander	2052 (1.4%)	850 (1.5%)	2902 (1.4%)	850/2902 (29.3%)	
Other	32697 (22.1%)	13627 (23.3%)	46324 (22.4%)	13627/46324 (29.4%)	
Not Provided	49398 (33.4%)	20864 (35.7%)	70262 (34%)	20864/70262 (29.7%)	
Ethnicity					<0.001
Non-Hispanic	87725 (59.3%)	33414 (57.1%)	121139 (58.7%)	33414/121139 (27.6%)	
Hispanic	31316 (21.2%)	13114 (22.4%)	44430 (21.5%)	13114/44430 (29.5%)	
Missing	28936 (19.6%)	11983 (20.5%)	40919 (19.8%)	11983/40919 (29.3%)	
Resides in Dental HPSA¥					<0.001
No shortage areas in county	9962 (6.7%)	3426 (5.9%)	13388 (6.5%)	3426/13388 (25.6%)	
Whole county a shortage area	23321	8715	32036	8715/32036	

	(15.8%)	(14.9%)	(15.5%)	(27.2%)	
Part of county a shortage area	114667 (77.5%)	46361 (79.2%)	161028 (78%)	46361/161028 (28.8%)	
Missing	27 (0%)	9 (0%)	36 (0%)	9/36 (25.0%)	
Preventive Medical Care Use					<0.001
No	28148 (19%)	2437 (4.2%)	30585 (14.8%)	2437/30585 (8.0%)	
Yes	119829 (81%)	56074 (95.8%)	175903 (85.2%)	56074/175903 (31.9%)	

*HPSA = Health Professional Shortage Area

Table 4. Unadjusted and Adjusted Analysis of Preventive Dental Care Utilization by Continuously Enrolled Washington Medicaid and ABCD Beneficiaries in 2012

	Unadjusted		Adjusted	
	Prevalence Rate Ratio (95% CI*)	**p-value**	**Prevalence Rate Ratio (95% CI*)**	**p-value**
SHCN**		<0.001		<0.001
No	Reference		Reference	
Yes	0.96 (0.95, 0.97)	<0.001	1.04 (1.03, 1.05)	<0.001
Age on 12/31/12				
0	0.14 (0.13, 0.15)	<0.001	0.14 (0.12, 0.15)	<0.001
1	0.5 (0.49, 0.51)	<0.001	0.48 (0.47, 0.49)	<0.001
2	0.75 (0.74, 0.76)	<0.001	0.73 (0.72, 0.74)	<0.001
3	0.86 (0.85, 0.87)	<0.001	0.85 (0.84, 0.86)	<0.001
4	0.96 (0.95, 0.97)	<0.001	0.96 (0.95, 0.97)	<0.001
5	Reference		Reference	
Ethnicity		<0.001		<0.001
Non-Hispanic	Reference		Reference	
Hispanic	1.37 (1.36, 1.38)	<0.001	1.19 (1.18, 1.2)	<0.001
Race		<0.001		<0.001
White	Reference		Reference	
Alaskan Native	0.87 (0.66, 1.15)	0.326	0.84 (0.65, 1.1)	0.203
American Indian	0.88 (0.85, 0.91)	<0.001	0.9 (0.87, 0.93)	0
Asian	1.13 (1.1, 1.16)	<0.001	1.12 (1.09, 1.15)	<0.001

Black	1.03 (1.01, 1.06)	0.003	1.03 (1, 1.05)	0.017
Hawaiian	0.95 (0.86, 1.05)	0.309	1.02 (0.92, 1.12)	0.726
Pacific Islander	1.08 (1.05, 1.12)	<0.001	1.04 (1, 1.07)	<0.001
Other	1.37 (1.35, 1.38)	<0.001	1.19 (1.18, 1.2)	<0.001
Resides in Dental HPSA¥		<0.001		<0.001
No shortage areas in county	Reference		Reference	
Whole county a shortage area	0.99 (0.97, 1)	0.122	0.92 (0.9, 0.94)	<0.001
Part of county a shortage area	1.04 (1.02, 1.06)	<0.001	0.98 (0.96, 1)	0.079
Preventive Medical Care Use		<0.001		<0.001
No	Reference		Reference	
Yes	1.44 (1.42, 1.46)	<0.001	1.55 (1.52, 1.58)	<0.001

APPENDIX:

Table 1: Case criteria for Identifying Children with Intellectual and/or Developmental Disability (IDD) Enrolled in Washington State Medicaid in Calendar Year 2012.

Condition	ICD-9 Codes
Autism	299, 299.01, 299.10, 299.8, 299.81, 299.9
Mental Retardation	317, 317.1, 318.00, 318.1, 318.2, 319
Cerebral Palsy	343, 343.1, 343.2, 343.4, 343.8, 343.9
Spina Bifida	741, 741.01, 741.02, 741.03, 741.9, 741.91, 741.93
Trisomy 21	758.00, 758.1, 758.2, 758.3, 758.31, 758.32, 758.33, 758.39, 758.4, 758.5, 758.6, 758.7, 758.8, 758.81, 758.89, 758.9
Tuberous sclerosis, Bourneville's disease	759.5
Fragile X syndrome	759.83
Fetal alcohol syndrome	760.71

Table 2: Case Finding Criteria for Identifying Children who are at Risk for Developing a Chronic Health Condition Enrolled in Washington State Medicaid in Calendar Year 2012.

Condition	ICD-9 Codes	CPT Codes	HCPCS Codes
Ventilator	997.3, V46.1		
Gastrostomy	V44.1	43760, 43830	B4153, B4155
Tracheotomy	31.29, 31.1, 31.2	31500, 31210, 31239, 31231, 31233, 31281	
Low Birth Weight	764.00 – 764.08, 764.10 – 764.18, 764.20 – 764.28, 764.90 – 764.98, 765.00 – 765.08, 765.10 – 765.18		
Pre-mature Birth	764.00-764.99, 765.00-765.29, *766*, 767.00-767.9, 768.00-768.9, *769*, 770.00-770.9, 771.0-771.89, 772.0-772.9, 773.0-773.5, 774.0-774.7,		

	775.0-775.9, 776.0-776.9, 777.0-777.9, 778.0-778.9, 779.0-779.99, 780.0-780.99
Infantile Seizures	779.0-779.9, 780.0- 780.9,781.0-781.9
Apnea of the Newborn	770.81, 70.82, 770.83,770.84,770.89