

Children in Foster Care in the State of Washington: Dental Service
Utilization and Expenditures

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A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Public Health

University of Washington

2012

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Program Authorized to Offer Degree:
Health Services

University of Washington

Abstract

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Objectives: This study describes dental utilization, expenditures and use of dental services among children in Washington State foster care. **Methods:** Washington State enrollment and claims data were used to identify children ages 0 months through 17 years who were enrolled in the foster care program for 11 months or more during 2008 (N=10,589). The overall dental utilization rate and for groups of services (diagnostic, preventive, routine restorative, complex/surgical, orthodontic) were calculated as the proportion of children who had any dental claim or for that service grouping. Individual total expenditures and by service grouping were calculated among children with at least one claim. Using Patrick et al.'s model of oral health disparities as a framework, measures were analyzed under three domains: individual (sex, race/ethnicity, age group, disability status, child history of substance abuse, child history of behavior problems); interpersonal (placement type); and community (placement urbanicity). Bivariate analysis was used to assess differences in utilization or expenditures across each measure. **Results:** Among the study population, 44% of children had at least one dental claim. By service grouping, the proportion of children with at least one claim was: diagnostic 41%; preventive 41%; routine restorative 12%; complex/surgical 14%; and orthodontic <1%. Utilization differed

significantly by all measures except sex and a child's history of substance abuse. The mean individual dental expenditure was \$287 (2008 dollars) and differed significantly by age group, race/ethnicity and behavior problems. **Conclusions:** The majority of children in this study did not receive an EPSDT dental service, to which they were entitled. Children in this study were more likely to receive a complex or surgical than a routine restorative service, and less than 1% of children had an orthodontic claim suggesting restorative and orthodontic services are underutilized, and delivery of care may be episodic. Children's individual measures were directly associated with their receipt of care, and several suggest a child's connectedness to the health system influences their access to dental services. Overall, these findings strongly suggest that unmet dental need exists among children in foster care, and that disparities in receipt of dental services exist among subpopulations of children in foster care.

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INTRODUCTION

In the United States, approximately three quarters of a million children are placed in the foster care system each year, and over 400,000 in foster care at any one time.¹ Approximately one-third of children in foster care are age 5 years or younger, one-fifth between 6 through 10 years of age, and half over 10 years old.² About 60% of children in foster care are of an ethnic or racial minority background.² The average length of stay in foster care is about 18 months.²

The federal Child Abuse Prevention and Treatment Act³ mandates states provide foster care to children who must be removed from their birth parents' homes in response to substantiated allegations of neglect (including medical neglect), abuse or both through the child welfare system (See Table 1, Glossary of terminology used in the child welfare system). In the years prior to 2010, approximately 78% of children in foster care experienced neglect, 18% physical abuse, and 9% experienced sexual abuse (percentages total more than 100% because some children experienced more than one type of maltreatment.)⁴ Children can be placed in foster care for reasons other than maltreatment⁵ including juvenile crime, serious parent-child conflict, or the need to treat serious physical or behavioral health conditions that cannot be addressed within the family. Among Washington State's 1.5 million children ages birth through 17 years, approximately 11,000 children are in foster care at any one time.¹

Children with Special Health Care Needs. In addition to experiencing of abuse, neglect, or other serious problems, many children in foster care come from families in poverty (about half of children come from families eligible for Aid for Families with Dependent Children [AFDC]).⁵ In addition to the stress associated with removal from their home and placement in the foster care system, children experience other stressors that place them at high risk for poor physical, mental, and developmental outcomes⁶ such as homelessness, caregivers with mental illness, or prenatal exposure to drugs and alcohol.⁵ Consequently, many children in foster care meet the definition of having a "special health care need;" that is, they have an "increased risk for a chronic physical, developmental, behavioral, or emotional condition and ... also require health and related services of a type or amount beyond that required by children in general."⁷ Estimates of the prevalence of special health care needs among children in foster care vary by definition and subgroup of children, but are always many-fold higher than national prevalence, ranging from 44% to >80%.⁸⁻¹⁴ For example, a federal report analyzing a sample of children ages 0 months through five years in three counties with the largest monthly foster care populations in the nation (Los Angeles County, New York City, and Philadelphia County) estimated that 58% of the children had serious physical health problems, and another 62% were at risk for serious health problems as a result of prenatal drug exposure.¹⁰

Medical and Mental Health Care Utilization & Expenditures. For all the reasons discussed above, children in foster care have higher medical and mental health care utilization and expenditures than other children who are poor.¹⁵ For example, a Washington State study¹¹ found significantly higher utilization of mental health care services, supportive services of visiting nurses and physical therapists, medical equipment, and specialized services or hospitalizations among children in foster care than their peers enrolled in AFDC. Mean health care expenditures over a 12 month period were also much higher among children in foster care (\$3075) compared to children in families receiving AFDC (\$543).¹⁶ A Pennsylvania study of children in foster care found their mental health expenditures to be 11.5 times greater (\$2082) than children receiving AFDC who were not in foster care (\$181).¹⁷

Access to Health Services. Despite the fact that most children in foster care are covered by Medicaid insurance,¹⁸ the physical and mental health needs of children in foster care go unresolved or even unaddressed.¹⁰ For example, a federally-commissioned study of health service utilization among children in foster care in eight states found the percentage of children who received a state-mandated initial medical examination within the established timeframe ranged from 42% to 97%.¹⁹ From the three-county federal report mentioned above on the health and health services used by children in foster care, about one-third (32%) of children were found to have had at least one identified

health need that was not met.¹⁰ Also, children with no known health problems in foster care are less likely to receive routine care than their peers with complex health problems.^{10, 20} For example, in the same report, among children with no identified health needs (about half of children in each sample location), 12% received no routine health care. Among children in that study, only 1% of children received needed medical diagnostic and follow-up services that, as part of a package of services (i.e. Early, Periodic, Screening, Diagnosis & Treatment [EPSDT]), states must offer to all Medicaid-eligible children.

Barriers to Medical and Mental Health Services. There are several barriers to the receipt of needed, quality health services for children in foster care. Identified systemic and organizational issues include: lack of specific child welfare agency policy addressing the health care needs of children in foster care, lack of funding for health services,²¹ and lack of resources within overstretched child welfare agencies with growing caseloads.²¹ Poor collaboration between systems of health care, the difficulty associated with obtaining health information from birth parents, the sophistication required to oversee complicated health care needs, and residential transience pose challenges to providing coordinated, quality care for children in foster care.^{18, 22-24} Consequently, the current health care model for health care delivery to children in foster care has been deemed inadequate.^{21, 24, 25} In response to these shortcomings, the American

Academy of Pediatrics (AAP) and Child Welfare League of America (CWLA) have called for a parallel system to manage health services for children in foster care. Termed "Health Care Management," this model requires "a structure apart from traditional casework and medical roles" by employing knowledgeable health care workers for the purpose of coordinating children's health care at the agency level.^{6, 24}

Dental Health Service Use. Although shortcomings regarding the provision of medical and mental health services and outcomes among children in foster care have been documented, less research has quantified use of dental services. Two federal reports of children's utilization of health services while in foster care identified dental care as an area of high unmet need.^{19, 26} The first report¹⁹ found that, among a sample of children living in foster care in five states, between 60 and 92% of children received timely EPSDT dental exams as defined by the states' own guidelines. Three of the states did not require initial dental exams despite federal child welfare guidelines on health oversight and coordination²⁷ which mandate state agencies to schedule an initial and follow-up dental screening for 100% of children in foster care (AAP²⁴ and CWLA⁶ guidelines recommend 100% of children receive, at minimum, an initial dental screening and bi-annual dental exams; and EPSDT periodicity standards require dental screening and treatment in accordance with professional guidelines.)²⁸ Of the two states requiring dental exams, only 29% and 66% of the sampled children, respectively, received timely exams. A second

national report by Child and Family Services²⁶ (CFSR) found that among 29 states needing improvement on identification of dental needs for children in foster care, 28 (97%) had insurance limitations and an insufficient number of dental providers available to meet children's identified dental needs. In 17 of 29 states evaluated (59%) the dental health needs of the children were not assessed and/or addressed.

Two studies described social, demographic and/or health characteristics of children who used dental services while in foster care, and/or the types of dental services they used. A study of Iowa dental claims²⁹ found 56% and 65% of all children enrolled in foster care had a diagnostic or preventive dental visit respectively, and only 6% received a restorative visit. Compared to other Iowan children enrolled in Medicaid managed care plans, a greater proportion of children enrolled in foster care had a dental claim. However, when comparing their use of services to children enrolled in Medicaid or SCHIP, a smaller proportion of children in foster care had a diagnostic (65% versus approximately 93% and 92% for Medicaid and SCHIP, respectively) or preventive (56% versus approximately 83% and 85% for Medicaid and SCHIP, respectively) service; and a much smaller proportion had a restorative (6% versus approximately 35% and 32% for Medicaid and SCHIP, respectively) or complex/surgical (3% versus approximately 20% and 16% for Medicaid and SCHIP, respectively) service.

A second study of medical and dental claims data in three states²⁰ by Rosenbach found utilization of dental services to be higher among children in foster care than children enrolled in AFDC or Supplemental Security Income (SSI). The proportion of children in California and Florida who received at least one dental service was comparable (43% and 44%, respectively), and was much higher in Pennsylvania (60%). However, utilization of dental care was found to be less common among several subgroups of children in the study, particularly those children who were not classified as severely ill. Less dental service utilization occurred among children who: were enrolled in foster care for part of a year (adjusted for months of coverage); did not have a chronic or disabling condition; were not enrolled in SSI; or had either a physical or mental condition (but not both). The study author speculates that children without chronic or disabling conditions are "less connected to the health care system," which may explain why those children "may have undiagnosed dental conditions."

Barriers to Dental Health Services. Overall, little is known about barriers to the receipt of dental services among children in foster care; however, similarities to medical and mental health barriers to care may exist. For example a national CFSR report published in 2011²⁷ identified limitations in Medicaid insurance and insufficient number of Medicaid dental providers as barriers to meeting children's dental need while in foster care. State-level CFSR reports from Washington State published in 2004 and 2010 identified a shortage of dental

providers as a barrier to care; in particular they noted a shortage of orthodontists.^{30, 31} These, and other factors and barriers to the receipt of dental care have been suggested by an exploratory study of dental care for children in foster care including: linguistic and cultural barriers for foster families; lack of resources available to case (social) workers (i.e. large caseload burden); lack of coverage for needed dental services; lack of systematic dental record-keeping; children's residential transience leading to the lack of a dental home; foster parents' competing needs; child behavior problems; and lack of dental 'buy-in' from adolescents.³²

Oral Health of Children in Foster Care. Even less is known about the oral health of children in foster care than their access to dental services. In particular, little is known of their dental caries burden. A cross-sectional study conducted in California compared the oral health status of young children in foster care (with a mean age of 3 years) to their Medicaid-enrolled peers overall. By physician report, 27% of children in foster care had visible tooth decay (their peers were not evaluated for this measure) and 31% of children in foster care were referred to a dentist compared to 10% who were not in foster care.³³ Another study, in which the oral health was assessed by visual exam, found that 38% of children in foster care had "orthodontic problems, plaque, severe dental caries, (or) missing teeth."²⁵ It is likely both studies underestimate the actual prevalence of disease because visual exams have been found to underestimate

actual decay prevalence by almost two-fold.³⁴ A third, qualitative study of health and social service professionals' beliefs and perceptions of the oral health and dental service utilization of children in foster care also suggested that dental problems often go undetected or untreated while a child is living in foster care.³²

Federal Child Welfare Policy and Oral Health. In summary, utilization and the determinants of utilization of dental care as well as the oral health of children in foster care are not well understood. Such knowledge is important foremost, in order to monitor and ensure the oral health of each child living in foster care. There are also policy implications, however, since children in foster care are under the care and protection of the federal Child Welfare System; a program authorized under Title IV-B of the Social Security Act requiring state and county governments to monitor and ensure the well-being of children in foster care, which includes their oral health.³⁵ In exchange for States' compliance with basic federal requirements, the Administration for Children and Families within the Department of Health and Human Services (DHHS) provides federal funding for state welfare programs.¹⁸

Pursuant to national findings that health care needs of children in foster care are not being met, federal requirements have become increasingly specific. For example, the Adoption and Safe Families Act (1997) required that states "develop and implement standards to ensure

children in (foster care) are provided with quality (dental) services; and that each state's performance in meeting the needs of children in foster care is assessed.⁶ In 2008, the Congress passed the Fostering Connections to Success and Increasing Adoptions Act, further requiring states to develop and administer "health oversight and coordination" plans for children in consultation with health care and child welfare experts. States are now explicitly required to outline for their child welfare agencies: a schedule for initial and follow-up dental visits that meet a "reasonable" standard of practice; how identified health needs of children will be monitored and treated; how their medical information will be updated and shared appropriately; steps to ensure continuity of care 'which may include the establishment of a medical home for every child in care;' and how the state will actively consult with health care and other stakeholders of children in foster care to ensure they are receiving appropriate dental treatment.²⁷

Objectives. This study examines utilization of dental services by children enrolled in Washington State's foster care program in 2008. Specifically, this study describes this population's social, demographic, health, and behavior characteristics, as well as utilization of dental care, dental care expenditures, and service use by service grouping (diagnostic, preventive, routine restorative, complex/surgical, orthodontic).

METHODS

Conceptual Framework and Study Design

Patrick et al.'s life course social and cultural model of oral health disparities³⁶ was used as the framework for this ecological, cross-sectional study. This model was chosen because it identifies multiple sources of influence on oral health and access to dental care. Study measures were organized under three social and cultural domains, as specified in the model: individual, interpersonal, and community.

Study Population

The study population consisted of all children ages 0 months through 17 years enrolled in Washington State's foster care program for at least 11 months during calendar year 2008 (N=10, 589). Records from 2008 were chosen for analysis because they were determined to be the most recent and reliable data given an administrative database change implemented by the State in 2009. This criterion met national measurement guidelines for analyzing health plan records and captured 62% of all children enrolled in Washington State's foster care system during 2008.³⁷ This study was approved by the Institutional Review Board of Washington State.

Data Sources

Data were assembled by the Washington State's Department of Social and Health Services Division of Research and Data Analysis (RDA). The RDA provided two subsets of data: one contained enrollment and demographic

characteristics of all children enrolled in Washington State's foster care program for 2008; the other contained dental claims files for 2008 for children in foster care which were selected using an identification code from the child's enrollment file. Dental services were identified in the claims files using the five-digit alphanumeric Current Dental Terminology (CDT) codes established by the American Dental Association (ADA) and grouped in five major categories of services (see Table 2 for definitions): diagnostic services [D0120-D0330]; preventive services [D1110-D1351, D4341, D4342, D4355, D4910]; routine restorative services [D2140-D2335, D2391-D2394]); complex/surgical services [D0350-D0999, D2390 & D1510-D1555 & D2410-D7999 & D9110-D9999] and orthodontic services [D8000-8999 & D0340].³⁸ Child-level dental expenditures were estimated by applying Washington State Medicaid's 2009 Dental Program Fee Schedule³⁹ to claims codes (fee schedule data from 2008 were no longer available at the time of the analysis).

Measures

Outcome measures. Three utilization outcomes were measured. An overall utilization rate was calculated as the proportion of the study population with at least one dental claim in 2008. Grouped utilization rates were calculated for diagnostic, preventive, routine restorative, complex/surgical, or orthodontic services as the proportion of the study population with at least one Medicaid dental claim for each service category. Service-specific utilization rates were calculated

as the proportion of dental claims for a service within a service grouping (i.e. percent of amalgam fillings within the routine restorative service grouping). Two expenditures outcomes were measured. The mean individual expenditure was calculated as the mean individual expenditure among children enrolled in Washington State foster care for 11 or more months in 2008 who had at least one dental claim. The mean general expenditure was the mean individual expenditure, excluding orthodontic claims.

Descriptive Measures. Measures for descriptive analyses were organized into three social and cultural domains: individual, interpersonal, and community. Measures ascribed to the individual included: sex, race/ethnicity, age group, disability status, a history of child substance abuse, and a history of behavior problems. Race/ethnicity was coded as White, African American, Asian/Pacific Islander, Hispanic, Native American, and Unknown. Child age was coded in three categories that correspond to the primary, mixed and permanent dentitions (ages <6, 6-11, and 12-17 years). Disability status was considered a dichotomous measure, defined by whether a child was enrolled in SSI during their last month of enrollment in foster care during 2008. A child's history of substance abuse or behavior problems was defined by whether a child was removed from his or her birth home for those reasons, respectively. A child's removal from the home for substance abuse includes infants who were "identified as being

affected by...withdrawal symptoms resulting from prenatal drug exposure.”⁴⁰

Placement type (Table 1) was the only interpersonal measure examined and was based on the child’s last placement setting during 2008: foster home care, kinship care, group/crisis/juvenile rehabilitation care, or independent living/temporary/other care. Urbanicity was the only community-level measure examined, and was reflected by the child’s final county of residence in the year 2008. The United States Department of Agriculture’s 2003 nine rural-urban-continuum codes were grouped to form the following four categories: metro, urban adjacent to metro, urban nonadjacent to metro, and rural.

Data Analysis

Frequency tables and histograms were generated to describe the study population in terms of individual-, interpersonal-, and community-level characteristics; and also to describe use of dental services by grouping. The Pearson chi-square test was used to assess for differences in the proportions of children who utilized dental care across each measure (e.g. sex, race, etc.) One way Analysis of Variance (ANOVA) was used to assess for differences in mean total dental expenditures across each measure.

RESULTS

Descriptive Data

The social, demographic, health and behavioral characteristics of children in this population are summarized in Table 3. Among the 10,589 children in this population, 38% were between 0 months and 5 years of age, 32% between 6 and 11 years, and 30% between 12 and 17 years. Just under half of the population was female (48%). About half (51%) of the children were White, and almost a fifth (18%) were Native American; a smaller proportion were African American (15%), Hispanic (12%), Asian or Pacific Islander (3%), or their race/ethnicity was unknown (4%). Overall, 11% of children in the population had a chronic or debilitating condition for which they were receiving SSI. Less than 2% of children were removed from their home for personal drug or alcohol abuse, and about 4% were placed into foster care for behavior problems. Most of the remaining children were removed from their homes for parental neglect (70%), parental drug abuse (34%), or physical abuse (13%) (these percents total more than 100% because children can be removed from the home for more than one reason). About half (51%) of children in this population lived in foster home care, 42% lived in kinship care; and 4% or less of the children lived in either group care/crisis center/juvenile rehabilitation or independent living/temporary care/other placement settings. Most children (86%) lived in a metropolitan area, with the remainder placed in urban (8%) or rural areas (6%).

Utilization

Among all children enrolled in foster care in Washington State in 2008 for 11 months or more, 44% of the total population had at least one claim for a dental service; 41% had a claim for a service in the diagnostic category; 41% had a claim in the preventive category; 12% had a claim in the routine restorative category; 14% had a claim in the complex/surgical category; and <1% had a claim in the orthodontic category (Table 4).

Diagnostic and Preventive Service Utilization. Of all diagnostic claims, 15% were for comprehensive examinations. Comprehensive exams are typically conducted at the initial dental visit and include: diagnostics, treatment planning, risk assessment and preventive counseling (i.e. anticipatory guidance). Dental check-ups, or "periodic examinations," comprised 21% of diagnostic claims; the intention of which is to assess oral health, and manage the child's individual caries risk through anticipatory guidance. Examinations to diagnose and treat acute problems such as pain or trauma, or "problem-focused examinations," comprised 7% of exam claims. During 2008, most preventive claims were for topical fluoride treatments (39%), prophylaxis (cleanings) (33%) or sealants (27%).

Routine restorative and Complex/surgical Service Utilization. Among the routine restorative claims, about one-third (34%) were for amalgam fillings; two-thirds (66%) were for composite fillings. The highest

proportion of complex/surgical claims were for extractions (21%), sedation or other anesthesia (20%), "unspecified procedures" (20%), stainless steel crowns (15%), and pulpotomies (7%). Of all complex/surgical care claims, 6% were billed for behavior management. When complex/surgical services were analyzed by age group, almost half (48%) of children age <6 had at least one complex/surgical claim, whereas the proportion of claims for children in older age groups (ages 6-11, 37%; and 12-17, 19%) was considerably smaller.

Orthodontic Service Utilization. Fully 45% of orthodontic claims were for treatment planning visits and cephalometric (diagnosis and orthodontic treatment planning) films. Slightly more than half (55%) of orthodontic claims were for treatment of any kind: either limited or interceptive treatment (13%), or comprehensive treatment (43%).

Individual-level Utilization. The proportion of females who had a dental claim (45%) was slightly higher than for males (43%) ($\chi^2_{(1)}=4.12$, $p=0.04$). Differences in behavior could plausibly be linked to a child's sex, causing children with behavior problems to receive less care;³² however, a sub-analysis suggests that a history of behavior problems does not modify the relationship between sex and dental use. Young children were least likely to have any claim (29%) compared to children in age groups 6-11 (52%) and 12-17 (54%) ($\chi^2_{(2)}=581.54$, $p<0.001$). Asian and Pacific Islander children were the most likely to have a claim (48%) among racial groups, whereas Native American (39%)

and African American (43%) children were least likely ($\chi^2_{(5)}=26.79$, $p<0.001$). A greater proportion of children enrolled in SSI had a dental claim (57%) compared to children who were not enrolled (46%) ($\chi^2_{(1)}=52.57$, $p<0.001$).

Utilization did not differ significantly in the population depending on a child's history of substance abuse. However, a greater proportion of children who were removed from their home for behavior problems had a dental claim (56%) compared to children who were not (44%) ($\chi^2_{(1)}=23.87$, $p<0.001$). Because children who are removed from their home for behavioral problems may be more likely to be placed in regulated placement settings compared to other children, "connecting" them to dental services, a sub-analysis of the data was conducted to verify whether this association existed in this study population. The results of the sub-analysis confirmed that a greater proportion of children with a history of behavior problems had at least one claim if they were placed in a more regulated setting (e.g. foster home care (58%) or group care/crisis/juvenile rehab (67%)) compared to children with behavior problems who were placed in less regulated settings (e.g. kinship care (40%) or independent living/temp/other* (29%) placement settings, ($\chi^2=19.54$, $F <0.001$). *Most children (88%) living in the "other" placement setting were in a temporary placement, which includes children who are hospitalized and in intake, but not yet in the foster home.

Interpersonal- and Community-level Utilization. The proportion of children in a group home setting who had at least one claim was also much higher (67%) compared to all other placement settings ($\chi^2_{(3)}=87.30$, $p<0.001$). Among all urbanicity groupings, children living in rural areas had the largest proportion with at least one claim (53%), whereas children living in urban non-adjacent to metropolitan areas (30%) had the smallest ($\chi^2_{(3)}=37.59$, $p<0.001$).

Expenditures

The mean individual dental expenditure among children in Washington State foster care for 11 or more months in 2008 was \$287 (SD \$502) per child (2008 dollars) (Table 4) and the mean general expenditure was \$255 (SD \$299). The mean individual expenditure for each of the grouped services was: diagnostic \$47 (SD \$26); preventive \$127 (SD \$161); routine restorative \$179 (SD \$165); complex/surgical \$137 (\$274); and orthodontic \$3097 (SD \$2437).

Individual-level Expenditures. Using one-way analysis of variance (ANOVA), significant differences in the mean total dental expenditure were detected among subgroups of children for each of the following measures: sex ($F_{(1)}=5.86$, $p=0.02$), age group ($F_{(2)}=63.38$, $p<0.001$), race/ethnicity ($F_{(5)}=2.66$, $p=0.02$) or child behavior problems ($F_{(1)}=6.68$, $p=0.01$).

Expenditures were higher among females (\$305, SD \$547) than males (\$270, SD \$452); and were more than twice among older children ages 12-17 (\$381, SD \$723) than young children <6 (\$163, SD \$228), likely because a higher proportion of females and older children utilized services. Of all racial groups, Hispanic children had much higher mean expenditures (\$343, SD \$721) than white children (\$284, SD \$474), whereas African American children had much lower mean expenditures (\$244, SD \$350). Though Asian and Pacific Islanders were most likely to receive care, their mean expenditure (\$266, SD \$326) was also below that of white children. Among Native American children had the lowest utilization, but their mean dental expenditure and variance (\$299, SD \$524) was higher than among white children.

Dental expenditures were greater among children who were enrolled in SSI (\$306, SD \$638) than for those who were not (\$286, SD \$480), though the difference was not found to be significant. However, expenditures were found to be significantly greater among children removed from their birth home for behavior problems (\$370, SD \$745) than children who were not (\$283, SD \$485). Expenditures were also higher among children removed from their birth home for reasons of substance abuse (\$328, SD \$472) than those who were not (\$287, SD \$502) despite identical utilization, however this was not found to be significant.

Interpersonal- and Community-level Expenditures. Among placement setting types, children in kinship care had the highest expenditure (\$299, SD \$443) ($F_{(3)}=0.64$, $p=0.59$), despite relatively low utilization. In contrast, children in group care had the highest utilization, well above the mean, with the lowest average expenditure (\$276, SD \$431) ($F_{(3)}=0.58$, $p=0.63$). Finally, children who lived in urban adjacent-to metropolitan areas had the highest mean expenditure (\$308, SD \$528); whereas children living in urban areas not adjacent to a metropolitan area had the lowest (\$214, SD \$275), in addition to having the lowest utilization.

DISCUSSION

The purpose of this study was to describe utilization of dental services among children in foster care in the state of Washington, their use of specific dental services, and dental expenditures for services billed.

Mandated Dental Services Not Received by Majority of Children

According to Medicaid claims data for the year 2008, 44% of children enrolled in Washington State foster care for 11 or more months received any dental care, and only 41% of the children received a diagnostic dental service; thus, the majority of children did not receive a single federally-mandated EPSDT dental service to which they were entitled. These outcomes are nearly identical to Washington State Medicaid dental utilization rates for children not enrolled in foster

care during the year 2008,⁴¹ implying that children in both groups experience a common set of barriers to dental services. Regardless of such comparisons however; overall dental utilization among children in Washington State foster care for 2008 is below Federal expectations. The obligation of federal and state governments is to ensure all children in foster care receive oral health services in accordance with EPSDT guidelines, outlined by the CWLA and corroborated by the AAP and the American Academy of Pediatric Dentistry (AAPD).²⁷

Tendency Toward Complex/Surgical versus Routine Restorative Care

A slightly smaller proportion of children in this study used routine restorative services than complex/surgical services, a reverse of the national trend among all children in the US.⁴² Because children in foster care appear to experience greater dental need than their peers not enrolled in foster care nationally,¹⁵ this findings suggest that children in this foster care population may be underutilizing routine restorative services. It has been posited that the intensive demands placed on social workers causes them to deprioritize routine dental care for children on their caseloads relative to acute care.³² This may explain in part, the relatively high rate of complex/surgical care in this study population.

Disparity in Utilization of Orthodontic Services

A major disparity exists between receipt of orthodontic services among children in this foster care population and the general population.

Overall, less than one-half of one percent of children in this study had an orthodontic claim, compared to the national rate among all children birth-age 20 during 2004 (18%).⁴² However, approximately half of orthodontic expenditures were for treatment planning, less than one quarter of one percent of all orthodontic services received by children during 2008 were for orthodontic treatment *per se*.

Unfortunately, neither EPSDT²⁸ nor child welfare policy entitles a child in foster care access to orthodontic services, though services may be authorized on a case-by case basis⁴³ when the oral impairment "is extreme," leaving out all children with dental need that is not considered "handicapping." The CSFRs from 2004³⁰ and 2010³¹ indicate one key barrier to access to dental services, especially orthodontic, among children in foster care is a shortage of dentists willing to accept Medicaid coupons. Thus, the extremely low utilization of orthodontic care among children in foster care in Washington State indicates a health service inequality driven, at least in part, by limitations at the macro level (i.e. child welfare policy, supply of dentists, Medicaid reimbursement), rather than dental need.

Individual-level Measures of Disparity in Dental Utilization and Expenditures

Dental utilization and expenditures among several vulnerable subpopulations of children in this study were assessed. The proportion of children who had a dental claim was found to differ significantly by age group, race/ethnicity, disability status, history of behavior

problems, placement type, and urbanicity. The mean dental expenditure also differed significantly by age group, race/ethnicity, and history of behavior problems.

Youngest Age Group Has the Most Caries Risk, Lowest Utilization. The age group in this study population with the smallest proportion of children to receive a dental service (29%) was children less than 6 years of age, and almost half (48%) of the children in this age group had at least one complex/surgical claim. Nationally, almost 19% of children ages 2-5 have at least one primary tooth with untreated decay, with Early Childhood Caries (ECC) most prevalent among low income and minority children.⁴⁴ Expenditures for children in this study also increased with age group, which may indicate unmet dental need since national evidence supports that older children exhibit more decay compared to younger children.⁴⁴ However, higher expenditures among older age groups may indicate higher fees associated with increased procedure complexity.

Non-White Children have Higher Caries Risk than White Children, Similar Utilization. While utilization rates among racial/ethnic groups in this study were roughly similar with the exception of Native American children, differences in the caries burden among children of different races and ethnicities in the State of Washington suggest utilization disparities exist by children's race or ethnicity. Compared to children who are White, children of other races in the

State of Washington have been found to have higher, and sometimes much higher caries experiences.⁴⁵ Hispanic children have one of the highest caries rates in the State of Washington (72%),⁴⁵ and studies have shown that low-income Mexican-American children also have a high prevalence of untreated caries.^{44, 46} However, less than half of Hispanic children in this study received a dental service and their utilization approximated that of white children. A very high mean expenditure and variance among Hispanic children in this study may also signal their high dental need. African American children in this study also had lower expenditures and utilization than white children, however, national⁴⁶ and state-level^{45, 47} studies have found higher prevalence of caries and untreated decay among African American children compared to white children. Perhaps most alarming is the extremely low dental service utilization among Native American children in this study, who represent almost a fifth (18%) of the children in Washington State Foster Care during 2008. Their above-average mean dental expenditure and high expenditure variance are consistent with study findings that Native American preschool children experience a high caries burden,⁴⁸ and the highest caries prevalence in both the State of Washington (77%)⁴⁵ and the nation (95%).⁴⁸ While these findings are highly suggestive that unmet dental need exists in this population of children, and that a greater proportion of unmet dental need exists among children of a racial or ethnic minority than among white children; these data cannot directly indicate whether this is the case or these children simply have lower health care needs.

Special Needs Connect Children to Dental Services: Behavior Problems, Disability, Substance Abuse. Fully eleven percent of children in this study population were enrolled in SSI for diagnosis of a chronic or severe physical or mental health problem and 4% were removed from their home for behavior problems. A greater proportion of children on SSI or with a history of behavior problems received dental care compared to those with a negative history which may be related to their "connectedness" to health care. For example, Rosenbach's study²⁰ found that dental utilization was higher among SSI-enrolled children living in foster care than those who were not, and increased as children had more disabling conditions, or "connectedness" to the health care system.¹⁹

Interpersonal- and Community-level Measures of Disparity in Dental Utilization and Expenditures

Regulated Placement Settings Connect Children to Dental Services. A similar "connectedness" may also exist for children in more regulated placement settings. For example, children in this study who lived in a group care/crisis center/juvenile rehabilitation setting were much more likely than other children to have a dental claim. Interviews with health professionals indicate that children living in more regulated placements such as group care are more likely to receive dental care.³² Also, a slightly greater proportion of children who lived in foster home care received a dental service compared to

children in kinship care or independent living/temporary/other placement settings. A federal report of health needs of children in foster care found children living in licensed foster home care consistently received more health services than children in kinship care due to more stringent state policies directed at licensed foster homes.¹⁰ Overall, the data support that utilization of services differs by placement setting, and may increase with placement setting regulation.

Differences in Utilization by Urbanicity. Children in urban, non-adjacent to metro areas were approximately 20% less likely to have a dental claim than children in rural areas, and had the lowest mean expenditure of all placement urbanicity groupings. Upon further investigation, children placed in these zip codes were living in Clallam and Jefferson Counties located the Northwest peninsula of the State, a federally designated health care provider shortage area for dental care.⁴⁹ Several Tribal Reservations are located in the area,⁵⁰ possibly explaining in part why Native American children had less claims than other groups of children. Interestingly, children living in completely rural areas (about 6% of the population) were the most likely to have a dental expenditure, with just over half of children having a dental claim. Typically, children in rural areas enjoy less access to dental care than their metropolitan peers,⁵¹ so this is an unexpected finding.

Next Steps in Research

Determining the caries and malocclusion burden among children in foster care is an important step for assessing their unmet dental needs and monitoring their well-being in accordance with federal child welfare mandates. Longitudinal analysis of the oral health of children in foster care is needed to determine whether they are receiving appropriate dental services and support from foster parents and case workers to obtain and maintain good oral health. Further research should also investigate which social, demographic, health and behavioral barriers exist to the receipt of dental services in this population. Research findings should guide future interventions designed to ensure all children in foster care receive the dental services to which they are entitled.

Limitations

This cross-sectional study analyzed dental utilization and expenditures among a population of children living in foster care in Washington State for 11 months or more; as such, it over-represents children who are in foster care over the long term, and under-represents children enrolled short term. Based on findings from Rosenbach, this may overestimate utilization, since dental utilization (enrollment period adjusted) increased among children who were enrolled for longer time periods in her study. For example, in her study, the proportion of children who had a dental expenditure among

children enrolled for 1-6 months was roughly five-fold less in the three states she analyzed than among children enrolled >11 months.²⁰

The use of claims data and a fee schedule to construct expenditures may have caused an underestimation of utilization and expenditures since Medicaid is the primary, but not an exclusive health care funding source for most children in foster care.¹⁹ Orthodontic expenditures may have also been overestimated since fees for services such as comprehensive orthodontic therapy were not amortized. The use of administrative data also posed restrictions on which factors in the framework may be measured. Broadly, the data allowed measurement of individual factors, with fewer factors available to measure and explain social and cultural determinants of oral health at or above the interpersonal level.

Finally, the generalizability of this study's findings are limited since Child Welfare Policy differs between and within States.¹⁸ Additionally, a higher proportion of Medicaid-enrolled children in Washington State receive dental care than children enrolled in Medicaid nationwide.⁵² Thus, children in this study population may have higher dental utilization than can be expected among children in foster care nationwide. Washington State's population is also unique, with a higher proportion of Native American children in this study (18%) than may be seen in many other U.S. cities. Despite these limitations, however, this study advances the literature in important

ways. To our knowledge, this is the first published study designed to examine dental care utilization, expenditures, and use of dental services among children in foster care. It highlights their underutilization of dental care; possible social, cultural, and medical disparities in utilization among subgroups of children; and gaps in our understanding of their dental need.

CLINICAL AND POLICY IMPLICATIONS

Standard of Dental Care for Children in Foster Care. The CWLA outlines the standards of oral health care for children in foster care in accordance with federal law,⁶ stating that children should receive dental health assessments in compliance with the AAPD's Oral Health Policies and Clinical Guidelines.⁵³ The AAPD guidelines also informed federal EPSDT program requirements,¹⁸ which the CWLA upholds as "essential to ensuring the well-being" of children in foster care.⁶ Thus, in order to monitor and ensure the well-being of children in their custody, child welfare agencies must at the very minimum increase overall dental utilization (44%) and preventive utilization (41%) to 100%. To minimally meet the EPSDT program diagnostic and preventive care requirements in accordance with AAP guidelines, child welfare agencies must ensure each child in foster care receives an initial dental exam by a dentist with pediatric dental expertise "at the time of eruption of the first tooth and not later than 12 months of age;" ongoing diagnostic and preventive services (e.g. x-rays, dental sealants), including anticipatory guidance/counseling at no

less than 6 month intervals; and early orthodontic treatment for malocclusion (e.g. space maintainers), as needed.

Enforcing Delivery of Dental Services. These guidelines underscore how routine risk assessment is the backbone of preventive dental care among children in foster care, and how the implementation of timely, coordinated, quality dental care is a shared effort between the physician, dentist, case worker, and foster parent. Despite the many individual, interpersonal- and community-level constraints observed in this study, however, the responsibility of ensuring children needed dental services rests with the child welfare agency.²⁷

Fulfillment of routine, timely EPSDT dental services must be enforced for three reasons: first, because they are the only federally mandated mechanism by which child welfare agencies are required to monitor and ensure oral health for children in their custody; second, because a high prevalence of chronic disease, including dental caries,³³ has been identified in this population; and third, because unmet dental need has been identified in this population.^{19, 54}

CONCLUSION

This study describes dental utilization, expenditures and use of dental services among children enrolled in Washington State's foster care system during 2008. Nearly 60% of this study population did not have a dental claim, indicating the majority of children in this

foster care population did not receive an EPSDT dental service, to which they were entitled. Children in this study were more likely to receive a complex or surgical than a routine restorative service, and less than 1% of children had an orthodontic claim suggesting restorative and orthodontic services are underutilized, and delivery of care may be episodic. Children's individual measures were directly associated with their receipt of care, and several suggest a child's connectedness to the health system influences their access to dental services. Overall, these findings strongly suggest that unmet dental need exists among children in foster care, and that disparities in receipt of dental services exist among subpopulations of children in foster care.

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APPENDIX A

Table 1: Glossary of terminology used in the child welfare system.	
Foster Care Terminology	Description
Abuse and neglect	Any recent act or failure on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act which presents an imminent risk of serious harm.
Medical neglect	Failure to provide necessary medical or mental health treatment
Placement Setting Categories	
Foster Family Care	Foster home, adoptive home, court-ordered unlicensed placement, licensed foster home (godparent), therapeutic foster home.
Kinship Care	Licensed foster home of relative, relative of specified degree (not receiving support).
Group Care	Detention center, juvenile rehabilitation, group care staff residential, group crisis residential center, group home, regional crisis residential center, secured crisis residential center.
"Other" Care	Regional assessment center, supervised independent living, temporary placement (i.e. hospital care, or runaway.)
Definitions adapted from "What is Child Abuse and Neglect" from the Child Welfare Information Gateway found at www.childwelfare.gov .	

Table 2. Dental service definitions and coding.		
CDT Codes	Type of Service	Examples of Care Rendered
D0120-D0330	Diagnostic	Examinations, dental radiographs (including panoramic radiographs).
D1110-D1351 & D4341, D4342, D4355, D4910	Preventive	Prophylaxis, fluoride treatments, oral hygiene instruction, sealants, periodontal scaling and maintenance.
D2140-D2335, D2391-D2394	Routine Restorative	Amalgam and resin fillings.
D0350-D0999 & D1510-D1555 & D2390, D2410-D7999 & D9110-D9999	Complex/surgical (Excluding Orthodontic)	Pulp therapy, extractions, stainless steel crowns, nitrous oxide analgesia, space maintenance, crowns.
D8000-D8999 & D0340	Orthodontic	Fixed appliances (braces), removable appliances (retainers), and cephalometric radiographs.

Table 3. Characteristics of children enrolled in Washington State Foster Care for 11 months or more during 2008. (N=10,589)

Characteristic	Enrolled in Foster Care N=10,589	
	Freq.	%
Sex		
Male	5,447	52.0%
Female	5,112	48.0%
Age Group		
0-5	4,047	38.0%
6-11	3,337	32.0%
12-17	3,205	30.0%
Race/Ethnicity		
White	5,443	51.0%
African American	1,606	15.0%
Asian/Pacific Isl.	268	3.0%
Hispanic	1,296	12.0%
Native American	1,937	18.0%
Unknown	39	4.0%
Disability*		
Enrolled in SSI	1,077	11.0%
Not enrolled in SSI	8,708	89.0%
Child Substance Abuse		
History of Substance Abuse	182	1.7%
No history of substance Abuse	10,407	98.3%
Child Behavior Problems		
History of Behavior Problems	421	4.0%
No history of Behavior Problems	10,168	96.0%
Placement Type		
Foster Home Care	5,425	51.2%
Kinship Care	4,394	41.5%
Group Care/Crisis/Juv. Reh.	346	3.3%
Independent Living/Temp/Other	424	4.0%
Placement Urbanicity		
Rural	628	5.9%
Urban non-adj. to metro	161	1.5%
Urban adj. to metro	691	6.5%
Metro	9,109	86.0%
*Total does not equal N due to 804 missing values for this measure.		

Table 4. Dental service utilization and expenditures among children enrolled in Washington State foster care for 11 months or more during CY 2008 (N=10,589). The Pearson chi-square test was used to assess for differences in the proportions of children who utilized dental care across each measure (e.g. sex, race, etc.) One way Analysis of Variance (ANOVA) was used to assess for differences in mean total dental expenditures across each measure.

OUTCOMES				
Dental Utilization and Expenditures	Users (N)	Utilization (%)	Mean Expenditure (\$)	S.D. (\$)
Overall (at least one claim)	4659	44%	287.32	501.56
General claims (excludes orthodontic)	4652	44%	254.75	299.28
Diagnostic claims	4360	41%	46.53	26.33
Preventive claims	4334	41%	126.86	161.65
Routine restorative claims	1247	12%	179.28	165.09
Complex/surgical claims	1533	14%	137.37	274.10
Orthodontic claims	49	<1%	3096.87	2436.70
MEASURES				
Sex^{†∞}				
Male	2356	43%	269.76	452.12
Female	2299	45%	305.31	547.13
Age Group^{†j}				
0-5	1181	29%	163.18	228.42
6-11	1745	52%	278.91	313.69
12-17	1729	54%	380.69	723.46
Race/Ethnicity^{†∞}				
White	2466	45%	283.74	473.52
African American	692	43%	244.45	350.48
Asian/Pacific Isl.	128	48%	266.36	325.65
Hispanic	594	46%	343.02	721.19
Native American	757	39%	299.01	523.58
Unknown	18	46%	248.77	244.14
Disability Status[†]				
Enrolled in SSI	618	57%	305.54	638.22
Not enrolled in SSI	3975	46%	285.83	480.19
Child Substance Abuse				
History of Substance Abuse	80	44%	328.08	472.10
No history of substance Abuse	4575	44%	286.60	502.07
Child Behavior Problems^{†∞}				
History of Behavior Problems	234	56%	369.83	744.67
No history of Behavior Problems	4421	44%	282.95	485.06
Placement Type[†]				
Foster Home Care	2403	44%	278.81	553.04
Kinship Care	1857	42%	299.38	443.14
Group Care/Crisis/Juvenile Rehabilitation	233	67%	275.60	431.09
Independent Living/Temp/Other Care	162	38%	292.07	417.59
Placement Urbanicity[†]				
Rural	330	53%	276.32	300.92
Urban non-adj. to metro	49	30%	214.41	274.97
Urban adj. to metro	332	48%	307.51	527.85
Metro	3944	43%	287.45	514.76
*Totals do not equal N due to 804 missing values for this measure. †Indicates a chi2 test statistic P value <0.05. ‡Indicates a chi2 test statistic P value <0.001. ∞Indicates an F-test statistic P value <0.05. jIndicates an F-test statistic P value <0.001.				