Race and Payor Type for Child Visits with Public Health Dental Hygienist Practitioners

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Abstract

Purpose. To examine whether growth in visits to Public Health Dental Hygiene Practitioners (PHDHPs) providing preventative dental services at a pediatric hospital clinic was predominantly among children receiving public insurance and children of minority background from 2013 to 2017.

Methods. Longitudinal descriptive data analysis from electronic health records for 6,856 children under age 18 years who visited PHDHPs co-located at a hospital clinic in Pittsburgh, PA, from 2013 to 2017. We compared visits between white versus non-white children and between children with public, private, and no or missing insurance by year.

Results. Visit volume doubled from 2013 (n=811) to 2017 (n=1868). The proportion of PHDHP visits with non-white children increased from 77% (n=625) in 2013 to 87% (n=1,472) in 2017 (P<.001). The proportion of PHDHP visits with children with public insurance increased from 72% (n=585) in 2013 to 82% (n=1,377) in 2017 (P<.001).

Conclusions. PHDHPs co-located at a pediatric hospital clinic saw a high proportion of visits from children of non-white race and with public insurance. Visits from children of minority race and with public insurance increased disproportionately as visit volume grew from 2013 to 2017, depicting a vehicle through which historically underserved children increasingly accessed preventive dental services. Thus, PHDHPs co-located at a pediatric hospital clinic have great

public health importance due to their potential to decrease oral health disparities among disadvantaged children.

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Preface

Acknowledgment

The study was funded by grant D88HP28508, "Postdoctoral Training in General, Pediatric and Public Health Dentistry and Dental Hygiene" from the Health Resources and Services Administration (PI: Robert J Weyant). I thank Dr. Jacqueline Burgette, my research mentor and advisor, and my co-authors—Samantha Faulds, Amy Stiles, and Drs. Kristin Ray, Alejandro Hoberman, Brian Martin—for their time and expertise in the completion of this study. I thank Helen Hawkey for her guidance on the legal terminology related to Public Health Dental Hygiene Practitioners.

Disclaimer

The views expressed in the study are those of the authors and do not necessarily reflect the views of the University of Pittsburgh, University of Pittsburgh Medical Center or the Health Resources and Services Administration.

1.0 Introduction

In the United States, there are disparities in the oral health and access to care in families with public insurance and minority backgrounds.[1-4] Accessing dental care is particularly important because the prevalence and severity of dental caries is high for children in these patient populations.[1,5,6] Dental caries is the most prevalent infectious disease in children,[1,2,5,7] present in 45.8 percent among two to 19-year-olds,[5] and can lead to severe pain,[2,8] loss of oral function, low weight, disrupted sleep, poor performance in school,[9] infection, and low quality-of-life[1,10] Oral health disparities in the United States are long-standing, and have long-term health, social, and economic consequences for disadvantaged children and their families.[1-4] Many dental public health efforts are aimed at providing more access to care for children through the integration of medicine and dentistry.[11-17]

Public Health Dental Hygiene Practitioners (PHDHPs) can be part of the solution to the access to care problem. In the state of Pennsylvania, PHDHP is an extra certification that a licensed dental hygienist can pursue to perform select dental services without direct supervision from a dentist, such as dental screenings with radiographs, adult and child prophylaxis, fluoride treatment, dental sealants, scaling and root planing and referral to a dental practitioner for further dental treatment.[18] PHDHPs can practice in a variety of public health settings including public or private educational institutions, correctional facilities, federally qualified health care centers, hospitals, home health care agencies, nursing facilities, cancer treatment centers, hospice centers and ambulatory surgical facilities.[18]

A collaborative program between the UPMC Children's Hospital of Pittsburgh's (CHP) Primary Care Center in the Division of General Academic Pediatrics (PCC) and CHP was

established in 2013. A dental room was created within the PCC and staffed with a CHP PHDHP who received indirect supervision from the CHP pediatric dentists. An integrated electronic health record (EHR) between PCC and CHP allowed PHDHPs to receive oversight from pediatric dentists at CHP on all documentation and to directly schedule patients with CHP pediatric dentists before the end of the patient's appointment. As a result, PHDHPs linked medical and dental services between PCC and CHP, circumventing common barriers to accessing pediatric dental care, such as identifying a pediatric dentist who accepts public insurance with an available appointment.

The objective of this study was to examine whether PHDHPs saw an increase in the proportion of visits from children with non-white race and public insurance from 2013 to 2017. We hypothesized that as the service grew in volume, growth would be disproportionately among children of minority background and children with public insurance due to greater relative advantage of this service among these populations known to have higher barriers to dental care.

2.0 Methods

2.1 Study design and data source

We performed a retrospective review of EHR data for all children under age 18 years who visited the PHDHP co-located at the PCC over a five-year period. We reviewed sociodemographic data beginning in 2013, when the PHDHPs began child dental visits at the pediatric hospital clinic, to 2017. This analysis was approved by the UPMC Quality Improvement Review Committee. Projects approved by this committee do not meet the formal definition of human subjects' research, so approval by an institutional review board was not required.

2.2 Study setting

PCC is a pediatric hospital clinic that provides comprehensive medical services. PCC is located in an urban setting in Pittsburgh, PA. The majority of patients are insured by Medicaid and identify their race and ethnicity as Black. In 2013, PCC developed a patient care room for the PHDHP to perform the following dental services: 1) clinical and radiographic oral evaluation with indirect supervision of the CHP pediatric dentists; 2) preventive dental services including child prophylaxis, fluoride varnish application and oral health education; and 3) referrals to the CHP pediatric dentistry department. Children visiting the PCC were given the option to receive preventive dental services by a PHDHP after a planned visit to their medical provider or during a separate dental appointment. Because children seen by PHDHPs should still see a dentist annually,

all families were provided a referral to CHP dentists for their next preventive visit (unless dental treatment was indicated sooner, in which case, this was also scheduled by the PHDHPs). Those who accepted the referral were scheduled an appointment at the CHP pediatric department and given appointment cards with date, time and location of the dental appointment before they left the PCC. The flow of PCC patients to the PHDHP is described in further detail in a previous manuscript.[19] Preventive dental health services by the PHDHP were available to all patients at PCC; and PHDHP appointment scheduling was encouraged by the front desk, primary care providers, and advertisements throughout the clinic.

2.3 Measures

Our main outcome variable, PHDHP dental visits, was measured as a count. The main exposure variable, race, was assessed as a binary variable. Families reported child race at the time of the dental visit. The majority of families identified their child's race as white (17%) or Black (75%), with the remaining 8% identified as one of the following: Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, More than One Race and Unknown Race. Because few children identified as neither white nor Black, we categorized all non-white children into one non-white category. The second main exposure variable, insurance type, was collapsed into three categories: 1) public insurance, defined as Medical Assistance, Children's Health Insurance Program, and Tricare; 2) private insurance; and 3) no insurance or missing insurance information.

Data Analysis. We used the Chi-square test to compare the proportion of visits to the PHDHP from white versus non-white children and between children with different insurance types

by year, from 2013 to 2017. All analyses were conducted using STATA 15 (StataCorp, College Station, TX).

3.0 Results

Over a five-year period from 2013 to 2017, 6,856 children under age 18 years were seen by the PHDHP co-located at the PCC (Table 1). The number of children's dental visits with the PHDHP doubled from 811 in 2013 to 1,686 in 2017 (Figure 1). Over one-fourth of the children were between the ages of three and four years-old (Table 1). The majority of caregivers reported that their child's race was a non-white race, with approximately three-fourths of caregivers identifying the child's race as Black (Table 1). The second most common child race reported by caregivers was white (17%) (Table 1).

The proportion of PHDHP dental visits with non-white children was 83 percent overall (n=5,718), increasing from 77 percent (n=625) in 2013 to 87 percent (n=1,472) in 2017 ($p<0.001$) (Table 1, Table 2). In 2014, this proportion of non-white children was 80 percent (n=1,052) and increased steadily each year to 84 percent (n=1,336) in 2015 and 85 percent (n=1,233) in 2016, (Table 1).

When comparing the proportion of PHDHP dental visits covered by each insurance type (public, private, and no or missing insurance), we found a significant difference between 2013 and 2017 ($X2(2) = 52.8$, $p<.0001$). However, when comparing the proportion of PHDHP visits covered by private versus non-private insurance (public and no/missing insurance), no change was apparent between 2013 and 2017 ($X2(1)=0.2$, $p=0.62$). Therefore, change in the proportion of insurance types for PHDHP visits was due to a shift from no or missing insurance to public insurance (Table 1). The proportion of dental visits with the PHDHP covered by no or missing insurance decreased nine percentage points, from 15 percent (n=123) in 2013 to six percent (n=108) in 2017, while the proportion of PHDHP visits covered by public insurance increased ten percentage points, from 72

percent (n=585) in 2013 to 82 percent (n=1,377) in 2017 (Table 1). The proportion of children with public insurance increased steadily between 2013 and 2017 (Table 1, Figure 1). Also, the proportion of PHDHP visits that were covered by public insurance increased significantly between 2013 and 2017 when excluding private insurance ($X2(1)=50.8$, $p<0.001$). To further support the significant increase in the proportion of PHDHP visits with public insurance coverage, there was a significant change in proportion between public versus non-public insurance types between 2013 and 2017 ($X2(1)=29.0$, $p<0.001$).

4.0 Discussion

Our study is the first to examine whether a growing PHDHP service co-located at a pediatric hospital clinic disproportionately cared for non-white children or children with public insurance. Our findings were consistent with our hypothesis that the proportion of both non-white children and those with public insurance would increase over time as the PHDHP program at PCC became more established over the five-year period.

Our results, that a PHDHP provided preventive dental services to non-white children or children with public insurance, is meaningful in the context of persistent oral health disparities in access to care for children, families with low incomes and racial and ethnic minorities. Addressing persistent oral health disparities in the United States may require novel interventions integrated with medicine, and our findings show that a PHDHP located at a primary care site with a high proportion of children with non-white race and public insurance may be one part of the solution. Children of color visit the dentist and receive preventive dental services less often than their white peers.1-4 The potential drivers of PHDHP visits for non-white children or children with public insurance in this study may be the same drivers that created the disparities in access to dental care. First, PHDHPs may have improved access to preventive dental services for non-white children and children with public insurance because of the limited availability of dental providers willing to see young children. Second, PHDHPs enabled families with public insurance to identify and schedule visits with dental providers who accept children with public insurance. Third, the use of PHDHPs co-located at a primary care setting lessened the difficulty for non-white children and children with public insurance to access preventive dental services due to geographic and logistical

barriers. These three potential drivers of the study results will be discussed further in the following paragraphs.

4.1 Access to Dental Services for Young Children

A common barrier to accessing dental care for families of young children is the difficulty of identifying and scheduling visits with a dental provider who is willing and able to see young children. Data from the 2000-2005 Medical Expenditure Panel Survey shows that 89 percent of infants and one-year-olds visited the physician while only one-and-a-half percent visited the dentist.[20] The discrepancy between child medical and dental visits may be explained by the fact that there is a limited supply of dental providers who are willing and able to provide preventive dental services young children.[21-24] Garg and colleagues (2010) found that less than 50 percent of general dentists saw children under age two years and that "discomfort with small children" was the most common reason for not seeing children.[21] Even among pediatric dentists, only 53 percent performed infant oral health examinations for children under age one year.[22]

Access to pediatric dental care, including preventive dental services, is an even greater challenge for families of color with young children compared to their white counterparts.[1-4] Edelstein and colleagues found that the percentage of children from birth to age six with a dental visit was lower for non-white children compared to white children using data from the Medical Expenditure Panel Survey.[2,3] From 2013 to 2017, the PHDHPs in the current study saw a total of 6,856 children aged zero to 17 years, 18% (n=1,209) of which were under age two years. By offering dental care for the youngest children, PHDHPs allowed pediatricians to have their patients

be seen by a dental provider that they knew would readily provide preventive dental services to their youngest patients of all racial and ethnic backgrounds.

4.2 Access to Dental Services for Children with Public Insurance

Not only is there a limited availability of dental providers that are willing to see children, but also there are even fewer dental providers who are willing to see children with public insurance. The literature describes the phenomenon of families with public insurance experiencing numerous challenges to accessing dental services for their children.[21,23,25-27] Even though public insurance, such as Medicaid, covers dental benefits for children, Smith and colleagues (2005) found that only 15 percent of dental offices would schedule a preventive visit for a five-year-old child with Medicaid insurance, while a mere three percent would see a Medicaid-insured child younger than one year of age.[27]

According to the Institute of Medicine (2011), African American and Latino children are more likely to be enrolled in Medicaid, so challenges to accessing dental services for children with public insurance is particularly relevant to children in low-income families of color.[4] Our findings are testament to that extent to which children need pediatric dental providers who accept public insurance. The PHDHPs in the study were employed by a health system that serves a predominately non-white and publicly-insured population, and therefore may have been filling a gap in needed child preventive dental services because they were willing to see children that other dentists may not have been willing to see in their practice.

The PHDHPs in this study successfully improved access to preventive dental services for disadvantaged children over the course of this five-year study from 2013 to 2017 because they

grew the program in a way that consistently increased its commitment to serving children with public insurance. Over the same time period, the proportion of visits of children with no or missing insurance decreased. This is a notable finding considering that the expansion of the Affordable Care Act (ACA) was implemented in Pennsylvania in 2015.[28] In Pennsylvania, the ACA expansion allowed children in households with incomes up to 319 percent of the federal poverty line to be eligible for either Medicaid or CHIP.[29] As a result, "more than 700,000 Pennsylvanians" gained Medicaid insurance coverage."[28] With increased Medicaid benefits for adults, there is a potential spill-over effect to increase child dental use.[30,31] In our study, the expansion of Medicaid insurance from the ACA may have contributed to the increase in the proportion of visits of children with public insurance.

The increase in preventive dental visits with the PHDHP over the five-year study period may have also been due to the increased practice of proactively scheduling dental visits for children when families called to schedule well-visits, thereby co-scheduling medical and dental visits when possible. Additionally, the increase in visits may have been due to the support from the pediatricians and administrators in the pediatric hospital clinic, who recognized the importance of preventive dental visits and encouraged families to see the PHDHP.

4.3 Geographic and Logistical Barriers to Accessing Dental Services

Lastly, the co-location of PHDHPs in a pediatric hospital clinic may improve access to dental services for underserved families with children because it addresses a known barrier to accessing dental care documented in the literature: transportation.[25,26] In one study by Mofidi and colleagues (2002), most caregivers of children with public insurance did not own a car and had to

rely on free transportation provided by social services.[26] The caregivers described this social services transportation as unreliable and inconvenient.[26] Because some families did not reside near an available dental provider, they also needed to travel long distances for their child's dental care, which affected the child's likelihood of visiting a dentist.[32,33] In the state of Pennsylvania, fewer than half of the counties have pediatric dentists, adding to transportation barriers.[34] Geographic location may particularly impact the use of preventative dental services for families of color. According to the Institute of Medicine (2011), racial and ethnic "disparities can be attributed to a number of complex societal factors, including lower incomes, a lower prevalence of dental coverage, and a dearth of dentists located in communities where racial and ethnic minorities live."[4] By co-locating the PHDHPs in the child's pediatric primary care clinic, this clinic provided preventive dental services at a site to which patients and families already had experience traveling. Scheduling preventive dental services with a pediatric primary care visit overcame travel barriers by requiring families to negotiate only one trip for both services. When a PHDHP had a no-show for a preventive dental appointment, the pediatricians and PHDHPs also had the flexibility to schedule patients present in clinic who were due for a preventive dental visit, thereby assisting families with both scheduling and transportation.

4.4 Limitations

The results of this study should be interpreted in light of its limitations. The demographics of children seen by the PHDHPs were shaped by the demographics of children seen in the PCC, which serves a predominantly Black and predominantly publicly insured population. In 2019, over 70% of patients identified as Black and over three-fourths of patients had Medicaid insurance. The

children identified as neither white nor Black were 8% of the entire study population, such that we could not investigate other racial or ethnic groups in this study. The unique practice model of a PHDHP practicing in a pediatric hospital clinic with a shared EPR may be difficult to implement in other settings and therefore may not be replicable. In this study, we did not have a comparison group of children who were seen at a pediatric hospital clinic without a PHDHP. Furthermore, we may have had measurement error with regards to missing data for child insurance. Missing data may have been an error in data retrieval from the claims data and not a lack of insurance at the time of the child preventive dental visit with the PHDHP.

4.5 Policy Implications

This study has three implications for policy and practice. First, this novel access to care solution, initiated by CHP, contributes to the national health objectives, Healthy People 2020, which include the oral health objective to "Increase the proportion of low-income children and adolescents who received any preventive dental service during the past year (OH-8)."[35] Second, PHDHPs assist medical providers to fulfill their professional goal to perform an oral health screening, fluoride varnish and referral to a dental home by one year of age.[36,37] When the physicians are unable to provide oral health services due to lack of time or oral health training,[38,39] PHDHPs at PCC can perform the oral health screening, apply fluoride varnish and refer all families to establish a dental home with the pediatric dentistry department at Children's Hospital Pittsburgh, all while located in the pediatric hospital clinic. Finally, this study on PHDHPs has policy implications for PHDHP practice. Currently, 42 states with laws permit a dentist to enter into a collaborative or affiliated practice agreements with a public health dental hygienist

(PHDH).[40] The American Dental Hygienists' Association (ADHA) defines these states as Direct Access States because they allow the PHDH to perform procedures with indirect but not direct supervision of a dentist in public health settings such as schools, community centers, hospitals, or nursing homes.[40] The impact of these laws are not fully understood, but our study provides evidence that PHDHPs can contribute to improving access to preventive dental services for disadvantaged children, which may decrease oral health disparities.

4.6 Future Studies

Our results point to several areas of future study. First, researchers can use implementation science to evaluate why a PHDHP co-located in a pediatric hospital clinic was acceptable to families with children that are non-white and have public insurance. Second, the success of PHDHP enhancing receipt of dental care should be determined in a variety of health systems and delivery models to differentiate the extent to which the success is due to the PHDHP or the integration between the medical and dental settings in this study. Lastly, partnership between PHDHPs and general dentists may warrant examination to determine if co-location of a dental provider in a medical setting could also enhance access to dental care to general dentists for underserved populations.

5.0 Conclusions

Significant oral health disparities exist for vulnerable populations, including children, families with low incomes, and racial and ethnic minorities. These results depict that PHDHPs co-located at a pediatric hospital site represent a vehicle through which children can increasingly use preventive oral health services and enter the dental health care system. As PHDHP visit volume grew, the service increasingly cared for a greater proportion of children identified as Black or other racial and ethnic groups as well as children with public insurance. Thereby, PHDHPs co-located at pediatric hospital clinics are a potential strategy to overcome challenges to accessing oral health services by children who are traditionally underserved and thereby decrease oral health disparities.

1. As PHDHP service grew, the service increasingly cared for a growing proportion of children identified as Black or other minority races.
2. As PHDHP visit volume grew, PHDHPs increasingly cared for a growing proportion of children insured by public insurance.
3. PHDHPs co-located at a pediatric hospital clinic have the potential to improve access to preventive dental services for disadvantaged children.

6.0 Tables & Figures

Table 1. Descriptive Characteristics of Children Age Birth to Seventeen Years-old who Visit the Public Health Dental Hygiene Practitioner (PHDHP)* at Children's Hospital Pittsburgh Primary Care Center in the General Academic Pediatrics Division from 2013 to 2017 (N=6,856).

	Total (N=6,856)	*2013 (n=811)*	*2014 (n=1,316)*	*2015 (n=1,599)*	*2016 (n=1,444)*	*2017 (n=1,686)*
Age						
0-1	18%	14%	19%	19%	18%	16%
2	18%	22%	18%	17%	18%	16%
3-4	26%	25%	27%	26%	25%	25%
5-7	16%	14%	15%	15%	16%	17%
8-11	21%	21%	18%	20%	20%	23%
12 to 17	2%	4%	2%	2%	2%	2%
Race**						
White	17%	23%	20%	16%	15%	13%
Non-white	83%	77%	80%	84%	85%	87%
Black	75%	70%	72%	74%	77%	79%
Asian	2%	2%	1%	2%	3%	3%
American Indian/Alaskan Native	0%	0%	0%	0%	0%	0%
Native Hawaiian/Pacific Islander	0%	0%	0%	0%	0%	0%
More than One Race	2%	1%	2%	1%	1%	2%
Unknown	4%	4%	4%	5%	3%	4%
Insurance						
Private	14%	13%	15%	13%	13%	12%
Public†	78%	72%	74%	79%	81%	82%
No Insurance/Missing	8%	15%	11%	7%	6%	6%

* PHDHPs are hygienists who are certified to perform screening, preventative dental services, and make referrals to dental specialists without supervision from a licensed dentist.
**Child race was self-reported by the child's caregiver.
†Public insurance was defined as Medical Assistance, Children's Health Insurance Program, and Tricare.

Table 2. Chi-square tests comparing White versus non-White Race and Private versus Public Insurance for Children Age Birth to Seventeen Years-old who Visit the Public Health Dental Hygiene Practitioner (PHDHP)* at Children's Hospital Pittsburgh Primary Care Center in the General Academic Pediatrics Division between 2013 and 2017.

	2013 (n=811)		2017 (n=1686)		Chi-square, *P*-value
	n	%	n	%	
Race*					42.70, *P*<0.001
White	186	23	214	13	
Non-white**	625	77	1472	87	
Insurance Type					
Overall					52.05, *P*<0.001
Public†	585	72	1377	82	
Private	103	13	201	12	
No or Missing	123	15	108	6	
Private					0.2, *P*=0.62
Private	103	13	201	12	
Non-Private Insurance	708	87	1485	88	

*Child race was self-reported by the child's caregiver.
**Non-white race was self-reported by the child's caregiver as Black, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, More than One Race, and Unknown Race.
†Public insurance was defined as Medical Assistance, Children's Health Insurance Program, and Tricare.

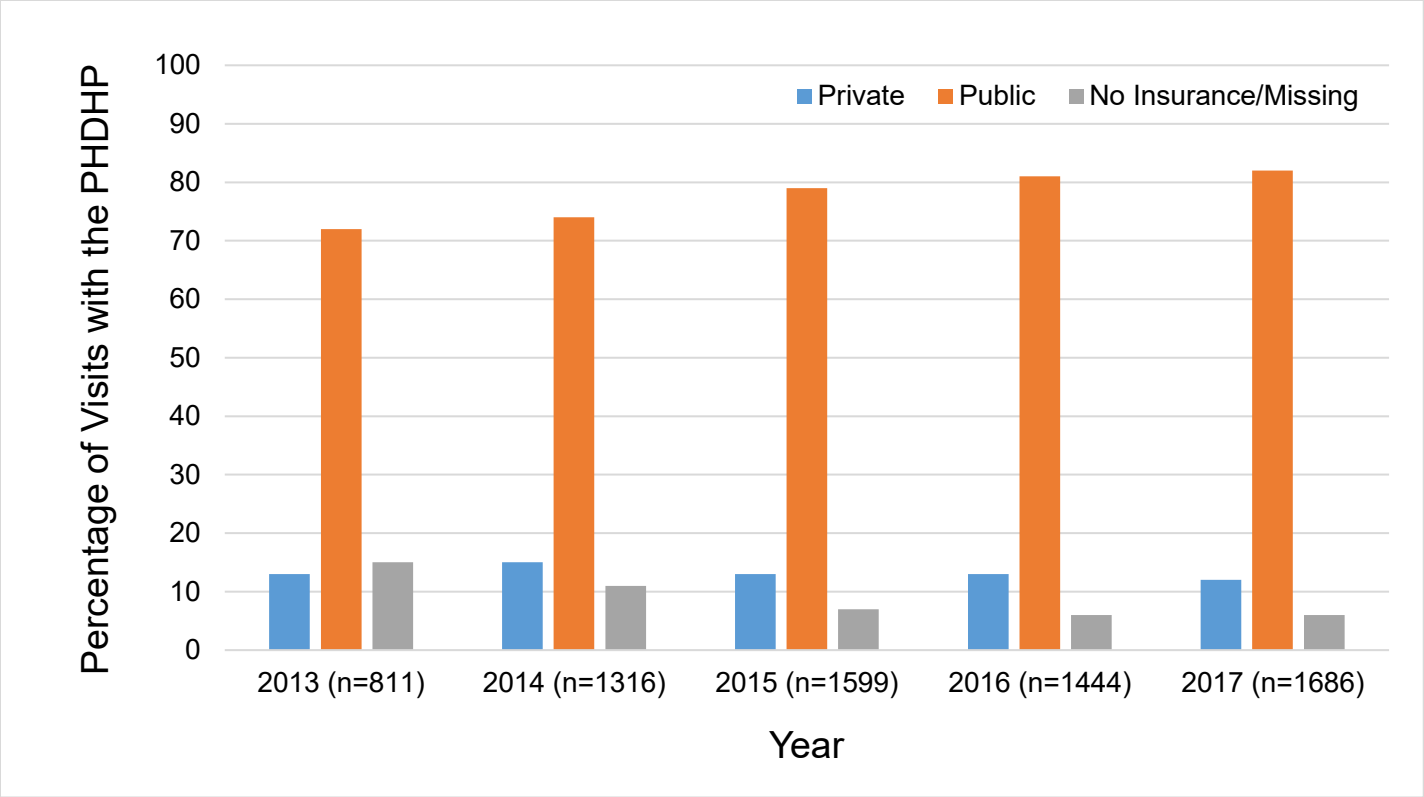

Figure 1. Type of Insurance for Children Age Birth to Seventeen Years-old who Visit the Public Health Dental Hygiene Practitioner (PHDHP) at Children's Hospital Pittsburgh Primary Care Center in the General Academic Pediatrics Division (PCC) by Year from 2013 to 2017 (N=6,856).

Note: PHDHPs are hygienists who are certified to perform screening, preventative dental services, and make referrals to dental specialists without supervision from a licensed dentist. Public insurance was defined as Medical Assistance, Children's Health Insurance Program, and Tricare.

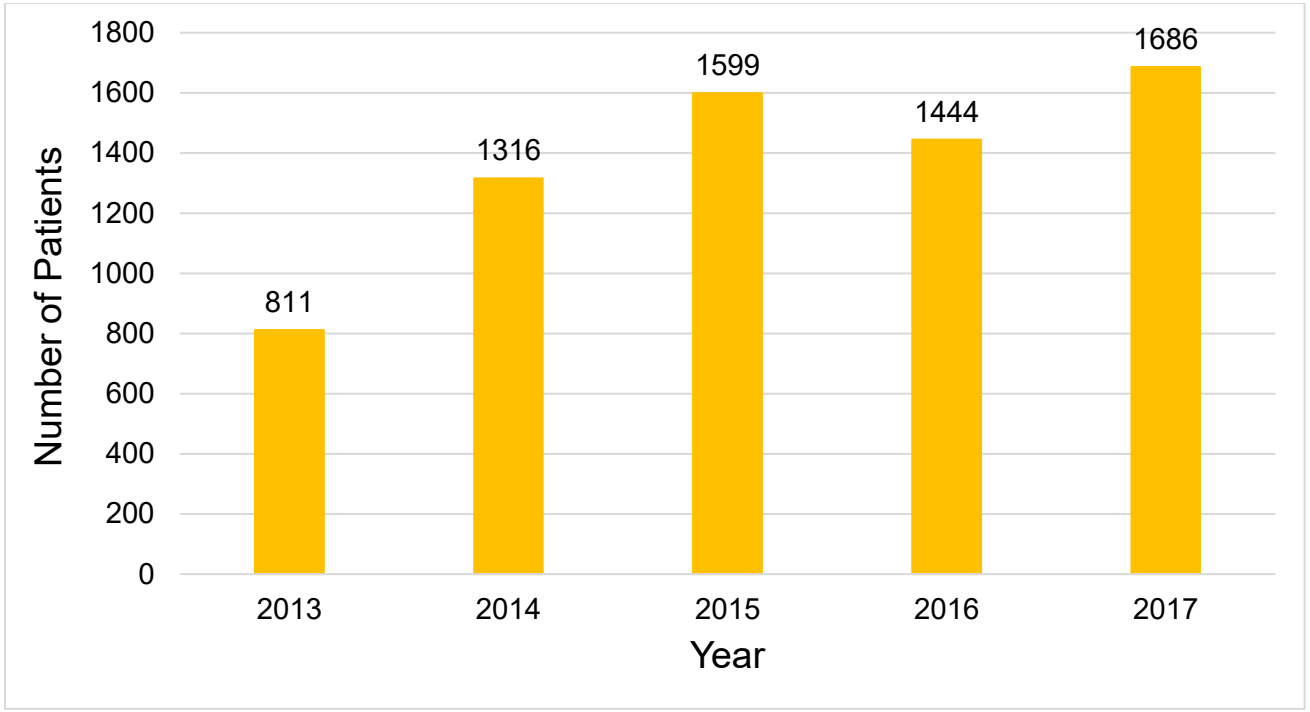

Figure 2. Number of Children Age Birth to Seventeen Years-old who Visit the Public Health Dental Hygiene Practitioner (PHDHP) at Children's Hospital Pittsburgh Primary Care Center in the General Academic Pediatrics Division (PCC) by Year from 2013 to 2017.

Note: PHDHPs are hygienists who are certified to perform screening, preventative dental services, and make referrals to dental specialists without supervision from a licensed dentist.

Bibliography

1. U.S. Department of Health and Human Services. Oral health in America: A report of the surgeon general. Rockville, Md: National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.

2. Edelstein BL. Disparities in oral health and access to care: findings of national surveys. Ambul Pediatr 2002;2(2 Suppl):141-147.

3. Edelstein BL, Chinn CH. Update on disparities in oral health and access to dental care for America's children. Acad Pediatr 2009;9(6):415-419.

4. Institute of Medicine and National Research Council. Improving access to oral health care for vulnerable and underserved populations. Washington, DC: The National Academies Press; 2011. https://doi.org/10.17226/13116. Available at: "https://www.nap.edu/catalog/13116/improving-access-to-oral-health-care-for-vulnerable-and-underserved-populations". Accessed April 6, 2020.

5. Fleming E, Afful J. Prevalence of total and untreated dental caries among youth: United States, 2015-2016. NCHS Data Brief 2018(307):1-8.

6. Peres MA, de Oliveira Latorre Mdo R, Sheiham A, et al. Social and biological early life influences on severity of dental caries in children aged 6 years. Community Dent Oral Epidemiol 2005;33 (1):53-63.

7. Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton-Evans G, Eke PI, Beltrán-Aguilar ED, Horowitz AM, Li CH. Trends in oral health status, United States, 1988-1994 and 1999-2004. External Vital Health Stat 11. 2007;(248):1-92.

8. Vargas CM, Monajemy N, Khurana P, Tinanoff N. Oral health status of preschool children attending Head Start in Maryland, 2000. Pediatr Dent 2002;24(3):257-263.

9. Jackson SL, Vann WF, Jr., Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health 2011;101(10):1900-1906.

10. Pahel BT, Rozier RG, Slade GD. Parental perceptions of children's oral health: the Early Childhood Oral Health Impact Scale (ECOHIS). Health Qual Life Outcomes 2007;5:6.

11. Atchison KA, Rozier RG, Weintraub JA. Integration of oral health and primary care: Communication, coordination, and referral. NAM Perspectives. Discussion Paper, National Academy of Medicine; 2018; Washington, DC. https://doi.org/10.31478/201810e. Available at: "https://nam.edu/integration-of-oral-

health-and-primary-care-communication-coordination-and-referral/". Accessed April 6, 2020.

12. Atchison KA, Weintraub JA, Rozier RG. Bridging the dental-medical divide: Case studies integrating oral health care and primary health care. J Am Dent Assoc 2018;149(10):850-858.

13. Braun PA, Cusick A. Collaboration between medical providers and dental hygienists in pediatric health care. J Evid Based Dent Pract 2016;16 Suppl:59-67.

14. Braun PA, Kahl S, Ellison MC, Ling S, Widmer-Racich K, Daley MF. Feasibility of colocating dental hygienists into medical practices. J Public Health Dent 2013;73(3):187-194.

15. Braun PA, Widmer-Racich K, Sevick C, Starzyk EJ, Mauritson K, Hambridge SJ. Effectiveness on early childhood caries of an oral health promotion program for medical providers. Am J Public Health 2017;107(S1):S97-S103.

16. Burgette JM, Preisser JS, Rozier RG. Access to preventive services after the integration of oral health care into early childhood education and medical care. J Am Dent Assoc 2018;149(12): 1024-1031 e1022.

17. Kranz AM, Rozier RG, Stein BD, Dick AW. Do oral health services in medical offices replace pediatric dental visits? J Dent Res 2020. https://doi.org/10.1177/0022034520916161. Available at: "https://journals.sagepub.com/doi/full/10.1177/0022034520916161#articleCitationDownloadContainer." Accessed April 28, 2020.

18. Pennsylvania Code. 49 Pa. Code § 33.205b. Practice as a public health dental hygiene practitioner. Commonwealth of Pennsylvania. Available at: "http://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/049/chapter33/s33.205b.html&searchunitkeywords=33.205b&origQuery=33.205b&operator=OR&title=null". Accessed April 14, 2020.

19. Burgette JM, Mestre Y, Martin B, Ray KN, Stiles A, Hoberman A. Success Rates of Pediatric Dental Referrals Made by Public Health Dental Hygiene Practitioners. [published online ahead of print, 2020 Nov 19]. J Public Health Dent 2020. doi:10.1111/jphd.12428

20. American Academy of Pediatrics. Profile of pediatric visits. Tables 9-10 [based on 2000-2005 Medical Expenditure Panel Survey and 2000-2004 National Ambulatory Medical Care Survey]. Updated 2010. Available at: "https://www.aap.org/en-us/Documents/practicet_Profile_Pediatric_Visits.pdf". Accessed April 14, 2020.

21. Garg S, Rubin T, Jasek J, Weinstein J, Helburn L, Kaye K. How willing are dentists to treat young children?: a survey of dentists affiliated with Medicaid managed care in New York City, 2010. J Am Dent Assoc 2013; 144(4):416-425.

22. Malcheff S, Pink TC, Sohn W, Inglehart MR, Briskie D. Infant oral health examinations: pediatric dentists' professional behavior and attitudes. Pediatr Dent 2009;31(3):202-209.

23. Seale NS, Casamassimo PS. Access to dental care for children in the United States: a survey of general practitioners. J Am Dent Assoc 2003;134(12):1630-1640.

24. Brickhouse TH, Unkel JH, Kancitis I, Best AM, Davis RD. Infant oral health care: a survey of general dentists, pediatric dentists, and pediatricians in Virginia. Pediatr Dent 2008;30(2):147-153.

25. Kelly SE, Binkley CJ, Neace WP, Gale BS. Barriers to care-seeking for children's oral health among low-income caregivers. Am J Public Health 2005;95(8):1345-1351.

26. Mofidi M, Rozier RG, King RS. Problems with access to dental care for Medicaid-insured children: what caregivers think. Am J Public Health 2002;92(1):53-58.

27. Smith RG, Lewis CW. Availability of dental appointments for young children in King County, Washington: implications for access to care. Pediatr Dent 2005;27(3):207-211.

28. Pennsylvania Insurance Department. Affordable Care Act in Pennsylvania Fact Sheet. Commonwealth of Pennsylvania. Available at: "https://www.insurance.pa.gov/siteassets/pages/default/aca%20fact%20sheet.pdf". Accessed April 14, 2020.

29. Kaiser Commission on Medicaid and the Uninsured. Modern era Medicaid. Table 2 [based on a national survey conducted by the Kaiser Commission on Medicaid and the Uninsured with the Georgetown University Center for Children and Families, January 2015]. Available at: "https://www.kff.org/wp-content/uploads/2015/10/8681-table-2.pdf". Accessed April 14, 2020.

30. Hudson JL, Moriya AS. Medicaid expansion for adults had measurable 'welcome mat' effects on their children. Health Aff (Millwood) 2017;36(9):1643-1651.

31. Venkataramani M, Pollack CE, Roberts ET. Spillover effects of adult medicaid expansions on children's use of preventive services. Pediatrics 2017;140(6).

32. Kranz AM, Lee J, Divaris K, Baker AD, Vann W Jr. North Carolina physician-based preventive oral health services improve access and use among young Medicaid enrollees. Health Aff (Millwood) 2014;33(12): 2144-2152.

33. Wehby GL, Shane DM, Joshi A, et al. The effects of distance to dentists and dentist supply on children's use of dental care. Health Serv Res 2017;52(5):1817-1834.

34. Baird MD, Baird MK, Vesely JV. Access to dental providers in Pennsylvania: Exploration of the county-level distribution of dental providers and populations in 2013. Rand Health Q 2016; 6(1):1.

35. Healthy People 2020 Topics & Objectives. Office of Disease Prevention and Health Promotion; 2020. Available at: " www.healthypeople.gov/2020/topics-objectives/topic/oral-health/objectives". Accessed April 14, 2020.

36. American Academy of Pediatrics. Preventive oral health intervention for pediatricians. Pediatrics 2008;122(6):1387-1394.

37. American Academy of Pediatric Dentistry. Policy on the dental home. Pediatr Dent 2018;40(6): 29-30.

38. Lewis CW, Boulter S, Keels MA, et al. Oral health and pediatricians: results of a national survey. Acad Pediatr 2009;9(6):457-461.

39. Close K, Rozier RG, Zeldin LP, Gilbert AR. Barriers to the adoption and implementation of preventive dental services in primary medical care. Pediatrics 2010;125(3):509-517.

40. American Dental Hygienists' Association. Direct access states. Revised January 2020. Available at: "https://www.adha.org/resources-docs/7513_Direct_Access_to_Care_from_DH.pdf". Accessed April 14, 2020.