

Unwarranted Geographic Variation in Utah Pediatric Dental Practice Patterns

No Conflicts of interests to disclose

BACKGROUND

Geographic variation in practice patterns has been well documented in the medical literature for over four decades as a reflection of quality and value in healthcare delivery. Variation is expected in the provision of healthcare to the extent that it reflects differences in population needs and preferences. Unwarranted variation represents variation in medical resources, utilization, treatment and outcomes that cannot be explained by patient needs, severity of illness, socioeconomics or patient preferences, often leading to lower quality and higher costs in the US healthcare system.

Much of the work surrounding geographic variation started with Dr. John Wennberg, MD, MPH who later developed the Dartmouth Atlas of Healthcare which has primarily utilized national Medicare data to document unwarranted geographic variation across the country. Due to the state-by-state nature of Medicaid, research surrounding variation in pediatrics has been much more challenging and therefore limited.

One example of unwarranted geographic variation in pediatric medicine was recognized over 40 years ago by Dr. Wennberg. Through his research it was documented that more than 60% of children in one Vermont city had their tonsils removed by age 15, while less than 20% of children in adjacent communities had undergone a tonsillectomy. A follow-up study was conducted in 2010 which showed similar variation in tonsillectomies in the Northeast ranging from a low of 2.7 tonsillectomies per 1000 children to a high of 8.1 per 1000 children¹.

In both instances, the significant variation was not correlated with population differences including age, sex, Medicaid coverage or socioeconomic status. This type of research has been critical to the medical community in raising awareness, creating best practice guidelines and helping physicians provide the highest quality care at the lowest appropriate cost.

To our knowledge, there have been limited studies conducted regarding whether geographic practice pattern variation exists within the pediatric dental community.

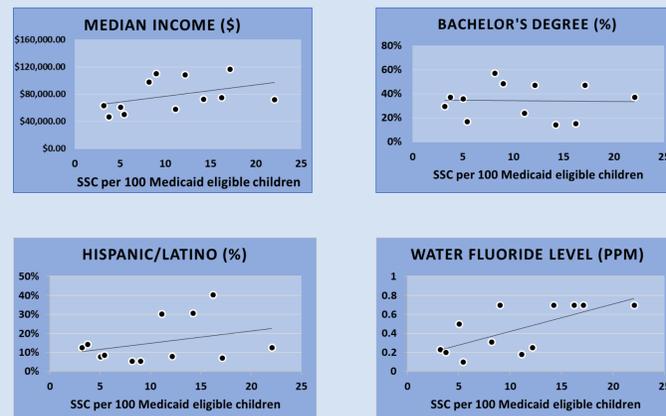
PURPOSE

To identify evidence of geographic variation within the practice of pediatric dentistry in the state of Utah with the goal of increasing awareness and initiating health policy conversations about the oral health and macro-economic implications as they relate to the quality of oral care received and the associated expense to the healthcare system.

DATA AND CHARTS

2018 Utah Medicaid Claims Data and Demographic Information							
City	Procedure Rate		Demographics				
	SSC per 100 Children	Pulp per 100 Children	Median income	Bachelor's degree or higher	Hispanic or Latino	Water Fluoride Level	Rural vs Urban
St. George	12.7	5.7	\$63,604	29.7%	12.5%	0.23	Rural
Logan	15.0	3.7	\$46,761	37.3%	14.3%	0.2	Urban
Ephraim	20.0	12.0	\$60,982	36.0%	7.8%	0.5	Rural
Vernal	21.7	8.5	\$50,692	16.8%	8.7%	0.1	Rural
Holladay	32.7	23.0	\$97,911	57.2%	5.4%	0.31	Urban
Kaysville	36.0	25.0	\$110,700	48.7%	5.4%	0.7	Urban
Ogden	44.5	22.9	\$58,284	23.9%	30.3%	0.18	Urban
Lehi	48.6	20.2	\$108,669	47.3%	8.0%	0.25	Urban
Magna	56.8	31.3	\$72,705	14.1%	30.8%	0.7	Urban
West Valley	64.8	27.6	\$75,137	15.3%	40.5%	0.7	Urban
Draper	68.5	20.7	\$116,977	47.4%	7.1%	0.7	Urban
Murray	88.2	46.9	\$72,524	37.3%	12.5%	0.7	Urban

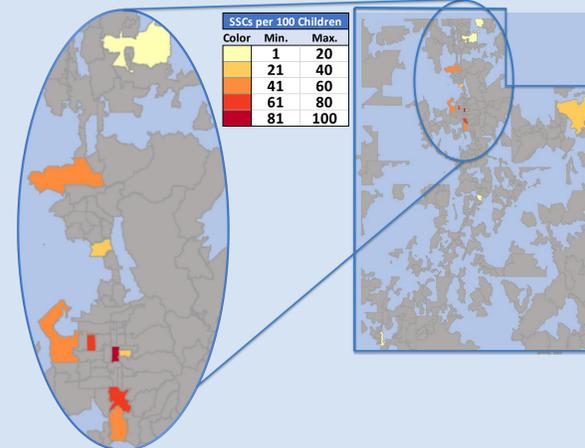
SSC Confounding Variable Scatter Plot



SSC Statistical Analysis

Statistical Analysis of Variation			
Quartile	Zip Code	Quartile Comparison	Z Test P-Value
1	84321		
	84770		
	84078		
2	84627	Q1 - Q2	P<.001
	84043		
	84020		
3	84404	Q2 - Q3	P<.001
	84117		
	84037		
4	84120	Q3 - Q4	P<.001
	84044		
	84107		

SSC Geographic Heat Map



METHODS

Dental Medicaid claims data were obtained through the Utah All Payer Claims Database for the year 2018. Twelve ZIP codes were selected from the state of Utah representing regions with differing demographics. Medicaid procedure rates specific to pulpotomies (D3220) and stainless-steel crowns (D2930) for children ages 0-11 were calculated and compared between ZIP codes using the z-test for independent proportions. Additionally, scatter plots were used to evaluate the effect of confounding variables including median income, education level, water fluoridation and ethnic diversity.

RESULTS

- Variations were identified between ZIP codes in pulpotomy rates (3.7 to 46.9 per 100 Medicaid-eligible children) and SSC rates (12.7 to 88.2 per 100 Medicaid-eligible children). Pulp/SSC ratios ranged from 24.6% to 70.6%.
- Statistically significant variations were noted between ZIP code quartiles (P<.001) for both pulpotomies and stainless-steel crowns.
- Scatter plots demonstrated no correlation with any confounding variables including median income, education level, water fluoridation and ethnic diversity, which provided supporting evidence of unwarranted geographic variation and that these co-factors alone do not account for the observed differences in procedure rates between zip codes.

CONCLUSIONS

Unwarranted geographic variation refers to differences in practice patterns between geographic regions which cannot be explained by socioeconomic status, evidence-based care, population needs or patient preferences. This study identifies preliminary evidence of unwarranted geographic variation in pediatric dental practice patterns in Utah which implies that geography influences the cost, quantity and quality of care that children receive. While the primary determinants of children's oral health lie primarily outside of the dental office, the continued development of clinical practice guidelines and a standardized, systematic approach to best practices has been shown to reduce costs and improve quality in the healthcare system. Further research is needed to understand the magnitude of unwarranted geographic variation in pediatric dentistry as well as the associated costs and quality implications at a national level.

1. Goodman, D. C., Morden, N. E., Ralston, S. L., Chang, C. H., Parker, D. M., & Weinstein, S. J. (2013). *The Dartmouth Atlas of Children's Health Care in Northern New England*.