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Research Article

Geographic Distribution of Pediatric Orthopaedic Surgeons throughout the United States

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Abstract

Introduction: The purpose of this study was to explore the geographic distribution of pediatric orthopaedic surgeons (POS) in the US as an accurate assessment of pediatric orthopaedic surgical care.

Methods: A list of all POS in the US was compiled using publicly available information from the Pediatric Orthopaedic Society of North America (POSNA). Name, practice location, and other contact information were recorded for a total of 1,188 surgeons. Surgeons were sorted into congressional districts (CDs). Using Dr. Richard Cooper's Trend Model and projections for the demand of orthopaedic surgeons in 2020, each state and CD was classified as having optimal, suboptimal, and greater-than-optimal numbers of POS.

Results: The most POS were in California, Texas, Florida, and New York and the least were in Wyoming and Montana. The median number of POS per state was 23 (range: 0-134). The median number of POS per CD was 2 (range: 0-38). Out of a total number of 435 CDs in the US, there were 187 CDs that had 0 POS. Furthermore, all 435 CDs had suboptimal numbers of POS.

Discussion and Conclusion: Currently, there is no surgeon: population ratio standard for POS specifically. Furthermore, numbers generated about orthopaedics in general are based on national figures and do not take into account local demographic, economic, and physician practice pattern variations that can cause suggested ratios to differ. However, the data generated from this study suggests that POS are not evenly distributed throughout the US and many areas are not optimally served.

Keywords: Pediatric orthopaedics; Care delivery; Geographic distribution; Surgeon allocation

1. Introduction

The geographic distribution of health care providers in the United States has been a concern because of the inverse correlation between the total number of physicians per capita and the quality of health care [1, 2]. Low physician population density leads to decreases in disease detection and worse patient prognoses [3]. While most seem to agree that physicians are geographically maldistributed, it can be difficult to specifically classify the adequacy of the physician workforce because national trends are constantly changing, and local variability exists [4, 5]. Classifying the ideal geographic distribution for pediatric orthopaedic surgeons (POS) is especially challenging because unlike other specialties, no surgeon:population benchmark exists for POS [5]. It has been shown that the more specialized the physician, the greater the maldistribution [5, 6]. For example, Neuwahl et al [6] found that besides pediatric rheumatology, pediatric orthopaedics had greater maldistribution than every other specialty they studied, including neurosurgery, ophthalmology and general orthopaedic surgery. The purpose of this study was to explore the geographic distribution of pediatric orthopaedic surgeons in the United States as an accurate assessment of pediatric orthopaedic surgical care.

2. Study Design

A list of all POS in the US was compiled using publicly available information from the Pediatric Orthopaedic Society of North America (POSNA). Name, practice location, and other contact information were recorded for a total of 1,188 surgeons. Using information from the US House of Representatives website [7], surgeons were sorted into congressional districts (CDs), each containing approximately the same population. Each surgeon was assigned to 1 CD based on their practice address. Census data for each CD was obtained from the US Census Bureau [8]. According to Dr. Richard Cooper's trend model and projections for the demand of orthopaedic surgeons in 2020, the demand for orthopaedic surgeons in 2020 will be 8.4 surgeons per 100,000 people [9, 10]. Using this as a reference standard, each state and CD was classified as having optimal, suboptimal, and greater-than-optimal numbers of POS.

3. Study Outcome

A total of 1,188 POSNA members were sorted into 50 states plus the District of Columbia, and then into 435 congressional districts. The states with the largest populations were California, Texas, Florida, and New York with 12.14%, 8.69%, 6.44%, and 6.09% of the US population respectively. Interestingly, these states also contained the largest percentage of the POS population; California (11.26%), Texas (9.33%), Florida (6.89%), and New York (6.55%).The states containing the lowest percentage of the US population

were the District of Columbia, Vermont, and Wyoming with 0.21%, 0.19% and 0.18% of the US population respectively. However, the lowest proportion of POS were in Wyoming and Montana; both containing 0.00% of the POS population. (Table 1) summarizes the US population and POS population by state.The median number of POS per state was 23 (range: 0-134). The median number of POS per CD was 2 (range: 0-38). Out of a total number of 435 CDs in the US, there were 187 CDs that had 0 POS. Furthermore, all 435 CDs had less than 8.4 POS per 100,000 people meaning that all 435 CDs had suboptimal numbers of POS.

State	State Population	POS Population	Percentage of US Population	Percentage of POS Surgeon Population
California	39,536,653	134	12.14%	11.26%
Texas	28,304,596	111	8.69%	9.33%
Florida	20,984,400	82	6.44%	6.89%
New York	19,849,399	78	6.09%	6.55%
Pennsylvania	12,805,537	53	3.93%	4.45%
Illinois	12,802,023	44	3.93%	3.70%
Ohio	11,658,609	63	3.58%	5.29%
Georgia	10,429,379	30	3.20%	2.52%
North Carolina	10,273,419	25	3.15%	2.10%
Michigan	9,962,311	24	3.06%	2.02%
New Jersey	9,005,644	29	2.76%	2.44%
Virginia	8,470,020	28	2.60%	2.35%
Washington	7,405,743	24	2.27%	2.02%
Arizona	7,016,270	19	2.15%	1.60%
Massachusetts	6,859,819	47	2.11%	3.95%
Tennessee	6,715,984	27	2.06%	2.27%

Table 1: Pediatric orthopaedic surgeons by state.

4. Discussion

Data generated from this study suggests that POS are not evenly distributed throughout the US and many areas are not optimally served. However, measuring physician demand is incredibly complex. This study used 8.4 surgeons per 100,000 people as a benchmark per Dr. Richard Cooper's trend model [9, 10] but there are other benchmark values that could also arguably apply. For instance, the GMENAC published in 1980 suggests that 6.2 surgeons per 100,000 people is the ideal number [10, 11]. An even lower bnchmark was proposed by Uribe-Leitz et al [12] in their paper analyzing access to surgical care. They suggested that anything less than 6 surgeons per

100,000 people was considered a surgical desert, meaning there was minimal access to surgical care [12]. Of note, every benchmark value mentioned above including the value used in this study, was proposed for orthopaedic surgery in general, not pediatric orthopedics. As mentioned, there is currently no surgeon: population ratio standard for POS specifically [5]. The lack of specificity in the benchmark value used could affect the validity of the outcome. Furthermore, numbers generated about orthopaedics in general are based on national figures and do not take into account local demographic, economic, and physician practice pattern variations that can cause suggested ratios to differ. While there is no specific benchmark for the number of POS needed, this study suggests that there are too few, and that they are maldistributed, as demonstrated in (Figure 1). To address these issues, additional POS should be trained and efforts should be made to attract POS to underserved regions in the US.

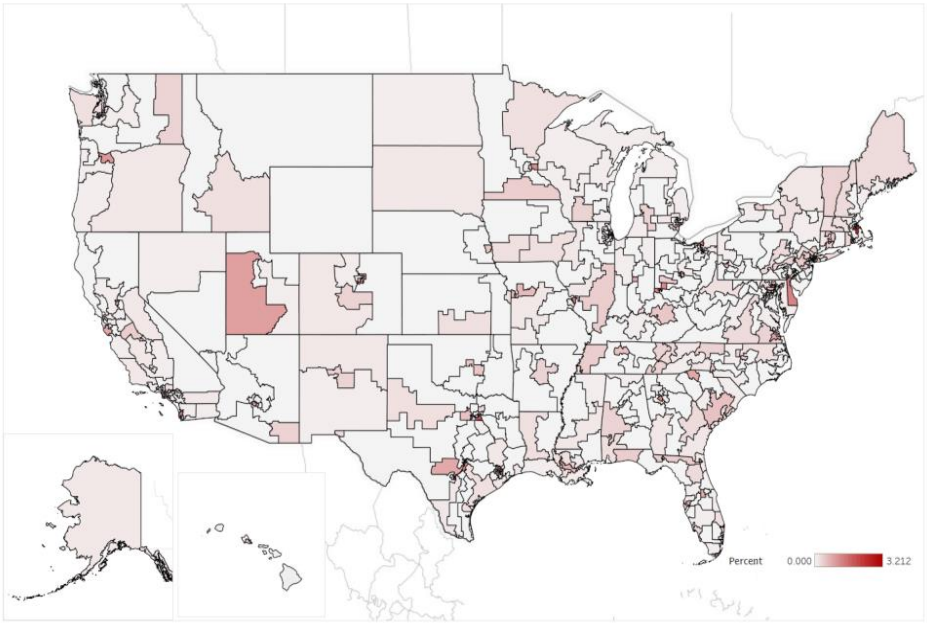

Figure 1: Choropleth of percentage of pediatric orthopaedic surgeons by congressional district (115th).

References

1. Cooper RA. States with more physicians have better quality health care. Health Affairs 28 (2009): 91-102.
2. Council on Graduate Medical Education. Physician distribution and health care challenges in rural and inner city areas. U.S. Department of Health and Human Services 10 (1998): 1-74.
3. Baron ED, Lutsky KF, Maltenfort M, et al. Geographic distribution of hand surgeons throughout the united states. J Hand Surg Am 43 (2018): 668-674.
4. Rosenthal MB, Zaslavsky A, Newhouse JP. The geographic distribution of physicians

revisited. Health Services Research 40 (2005): 1931-1952.

5. Sawyer JR, Jones KC, Copley LA, et al. Pediatric orthopaedic workforce in 2014: current workforce and projections for the future. J Pediatr Orthop 37 (2017): 59-66.
6. Neuwahl S, Ricketts TC, Thompson K. Geographic distribution of general surgeons: comparisons across time and specialties. Bull Am Coll Surg 96 (2011): 38-41.
7. United States House of Representatives. Find your representative tool.
8. U.S. Census Bureau. American Community Survey 1-Year Estimates. American Fact Finder (2017).
9. Cooper RA, Getzen TE, McKee HJ, et al. Economic and demographic trends signal and impending physician shortage. Health Affairs 21 (2002): 140-154.
10. Merritt Hawkins. Demonstrating community need for physicians. White Paper Series (2017).
11. McNutt DR. GMENAC: Its manpower forecast framework. Am J Public Health. 1981; 71: 1116-1124.
12. Uribe-Leitz T, Esquivel MM, Garland NY, et al. Surgical deserts in california: an analysis of access to surgical care. J Surg Research 223 (2018): 102-108.